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mass save®
Savings through energy efficiency

Who is Mass Save®?

Mass Save® is an initiative sponsored by Massachusetts' gas and electric utilities and energy efficiency service providers, including Columbia Gas of Massachusetts, The Berkshire Gas Company, Cape Light Compact, National Grid, Liberty Utilities, NSTAR, Unitil, and Western Massachusetts Electric Company. The Sponsors of Mass Save work closely with the Massachusetts Department of Energy Resources to provide a wide range of services, incentives, trainings, and information promoting energy efficiency that help residents and businesses manage energy use and related costs.

Residential New Construction Offers

- **Low-Rise New Construction**
  - Performance Path – based upon a % improvement over the MA baseline – incentives up to $7,000
  - Prescriptive Path – incentives up to $7,000 for measures beyond MA baseline
- **High-Rise New Construction**
  - Incentives based upon actual measures

We also offer incentives and rebates for existing buildings as well. Please visit www.MassSave.com for the details.

Commercial New Construction Offers

- **Incentives for efficiency levels beyond code:**
  - **Whole building incentives**
  - **System incentives including**
    - Air Compressors
    - Chillers
    - Lighting and Lighting Controls
    - Gas-Fired Heating Equipment
    - Variable Speed Drives
    - Custom Measures
    - And more

We also offer incentives and rebates for existing buildings as well. Please visit www.MassSave.com for the details.

AIA Continuing Education

Conservation Services Group is a Registered Provider with The American Institute of Architects Continuing Education Systems. Credit earned on completion of this program will be reported to CES Records for AIA members. Certificates of Completion for non-AIA members are available on request.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product. Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Important Disclosure

These trainings are being offered through the support of Mass Save® and in cooperation with the Massachusetts Board of Building Regulations and Standards (BBRS). The Energy Code Technical Support staff, consisting of CSG and other contractors, are not code officials, and the information provided through the program is not a formal interpretation of the code. **Your local building code official is responsible for the enforcement of the code** and the Massachusetts BBRS is the governing body responsible for interpretations of the code.

Learning Objectives

Massachusetts Residential Energy Code: Envelope and Building Science

1. 2012 IECC enclosure requirements
2. Strategies for code compliance
3. Recognize a good insulation job
4. How to reduce air leakage

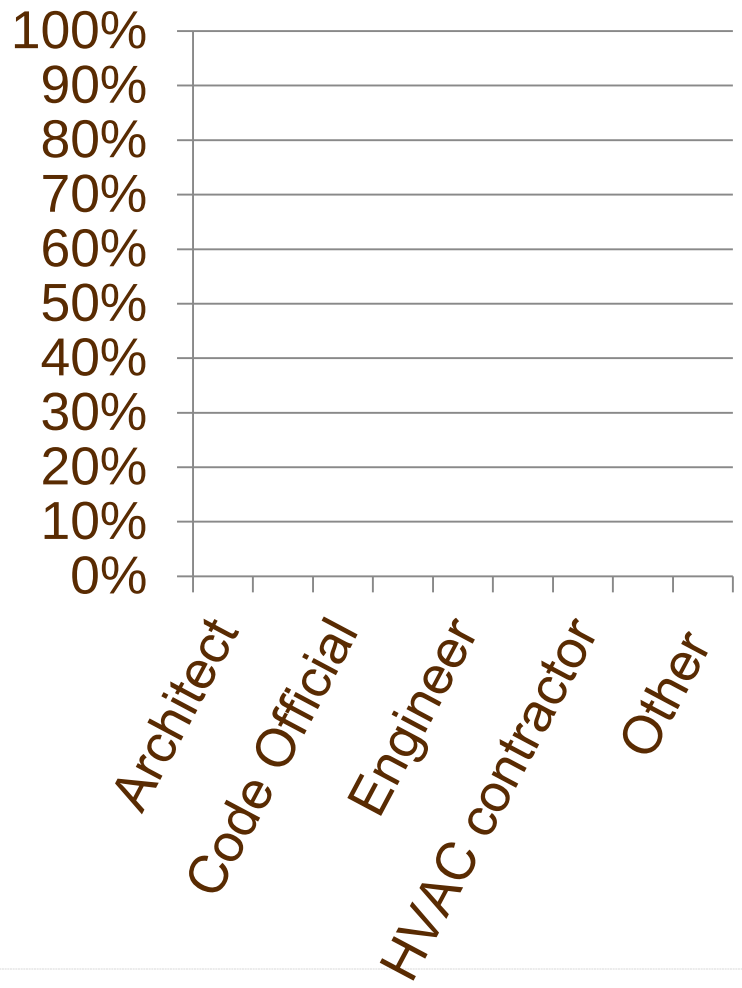
Audience Response System

- Get out your clickers
- Question slides will appear
  - Be ready to respond

Audience Makeup

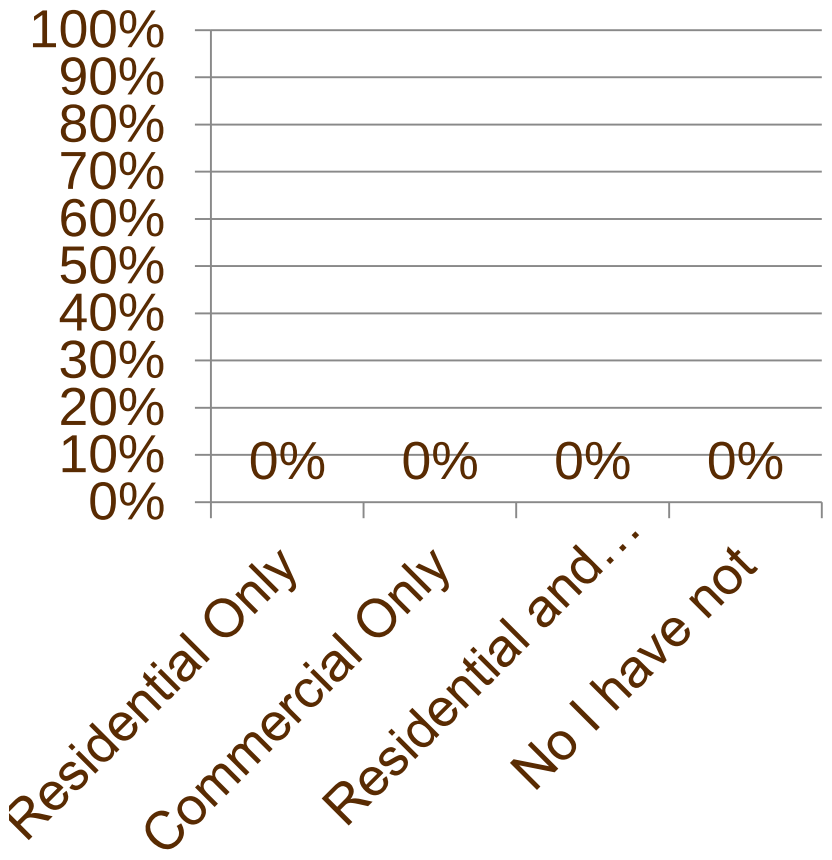
Are you…?

1. Architect
2. GC/Builder/Remodeler
3. Code Official
4. Developer
5. Engineer
6. Manufacturer
7. HVAC contractor
8. Energy Specialist
9. Other



- Have you attended a Mass Save® Code Training Before?

1. Residential Only
2. Commercial Only
3. Residential *and* Commercial
4. No I have not



Mass Save® Energy Code Technical Support

Project Specific Code Assistance

- MA code officials
- Design professionals
- Contractors
- Material suppliers
- Other

Toll-free energy code support

855-757-9717

Phone assistance

Office visits

Project site visits

2012 IECC Air Leakage Requirement

Must comply with air barrier and insulation table

AND

3 ACH50 Leakage?

1. True
2. False

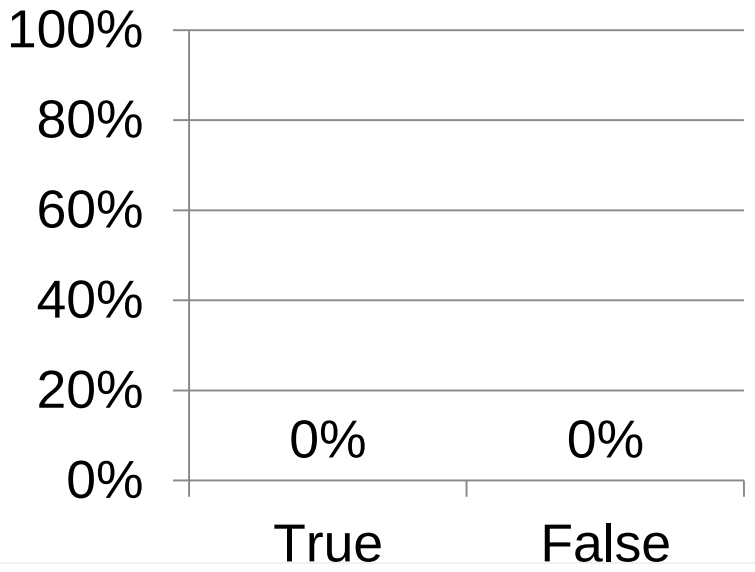


Photo © Conservation Services Group

Photo © Conservation Services Group

Photo © Conservation Services Group

Stretch Code

Question: Which version of the *International Energy Conservation Code* does the Stretch Code utilize?

Answer: The IECC 2009. Note that the Stretch Code remains unchanged on July 1, 2014 and it applies to certain buildings, portions thereof and additions. (Refer to 115.AA, Section 101.2, “Scope”.)

BBRS Official Interpretation No. 2014_04, May 13, 2014

MA Stretch Code Compliance

Construction	Performance Option	Prescriptive Option
New Homes (0- 2,999 sq. ft)	HERS ≤70, TBC 2009 IECC	N/A
New Homes (3,000 sq. ft. +)	HERS ≤65, TBC 2009 IECC	N/A
Additions (0-2,999 sq. ft.)	HERS ≤70, TBC 2009 IECC	2009 IECC – Chap. 4, ENERGY STAR Windows, TBC, Ducts tested to 4%
Additions (3,000 sq. ft.+)	HERS ≤65, TBC 2009 IECC	2009 IECC – Chap. 4 ENERGY STAR Windows, TBC, Ducts tested to 4%
Renovations (0-1,999 sq. ft.)	HERS ≤85, TBC 2009 IECC	2009 IECC – Chap. 4 (fill cavity), TBC, ENERGY STAR Windows, Ducts 4%
Renovations (2,000 sq. ft. +)	HERS ≤80, TBC 2009 IECC	2009 IECC – Chap. 4 (fill cavity), TBC, ENERGY STAR Windows, Ducts 4%

2012 IECC - Major Updates

- Blower Door 3 ACH50
- Attic R-49
- Basement wall R-15/19
- Duct Testing - Limits to leakage
  - 4 cfm/100 sq.ft.
  - 3 cfm/100 sq.ft. no air handler
- Mechanical ventilation
- Lighting 75% high efficacy

Compliance Pathways

- Projects *shall* comply with
  - Mandatory Sections *and*

    either
  - Prescriptive (Includes REScheck)

    or
  - Performance

2012 IECC

Performance Path

2012 IECC – R405

- Annual energy cost

MA Amendments R405.7

- HERS
  - Index =< 65
  - ENERGY STAR Thermal Enclosure Checklist
- Passive House Planning Package (PHPP)
  - Specific space Heat Demand =< 16 kBtu/sq ft/year

Table R402.1.1
Insulation Requirements (Prescriptive)

Component	2009 IECC	2012 IECC
Windows	U-0.35	**U-0.32**
Skylight	U-0.60	**U-0.55**
Ceiling	R-38	**R-49**
Frame Wall	R-20 or R-13 + 5	R-20 or R-13 + 5
Mass Wall	13 / 17 (Ext/Int)	13 / 17 (Ext/Int)
Floor	R-30	R-30
Basement / Crawlspace Wall	R-10 / R-13	**R-15 / R-19**
Slab R-Value / Depth	R-10 / 2 ft (+ R-5 heated)	R-10 / 2 ft (+ R-5 heated)

Renovating Conditioned Space. What do I Have to do?

R303.2 Installation

General Insulation Requirements

All materials. . . shall be installed according to manufacturer's instructions. . .

2012 IECC

R303.1
Insulation markings

Photo © Conservation Services Group

R303.1.1.1 Blown or Sprayed Roof/Ceiling Insulation

1/300 SF in attic, *facing* access

Blown FG or cellulose- Minimum initial thickness

Photo © Conservation Services Group

Bad Installation

Photo © Conservation Services Group

Good Installation

Photo © Conservation Services Group

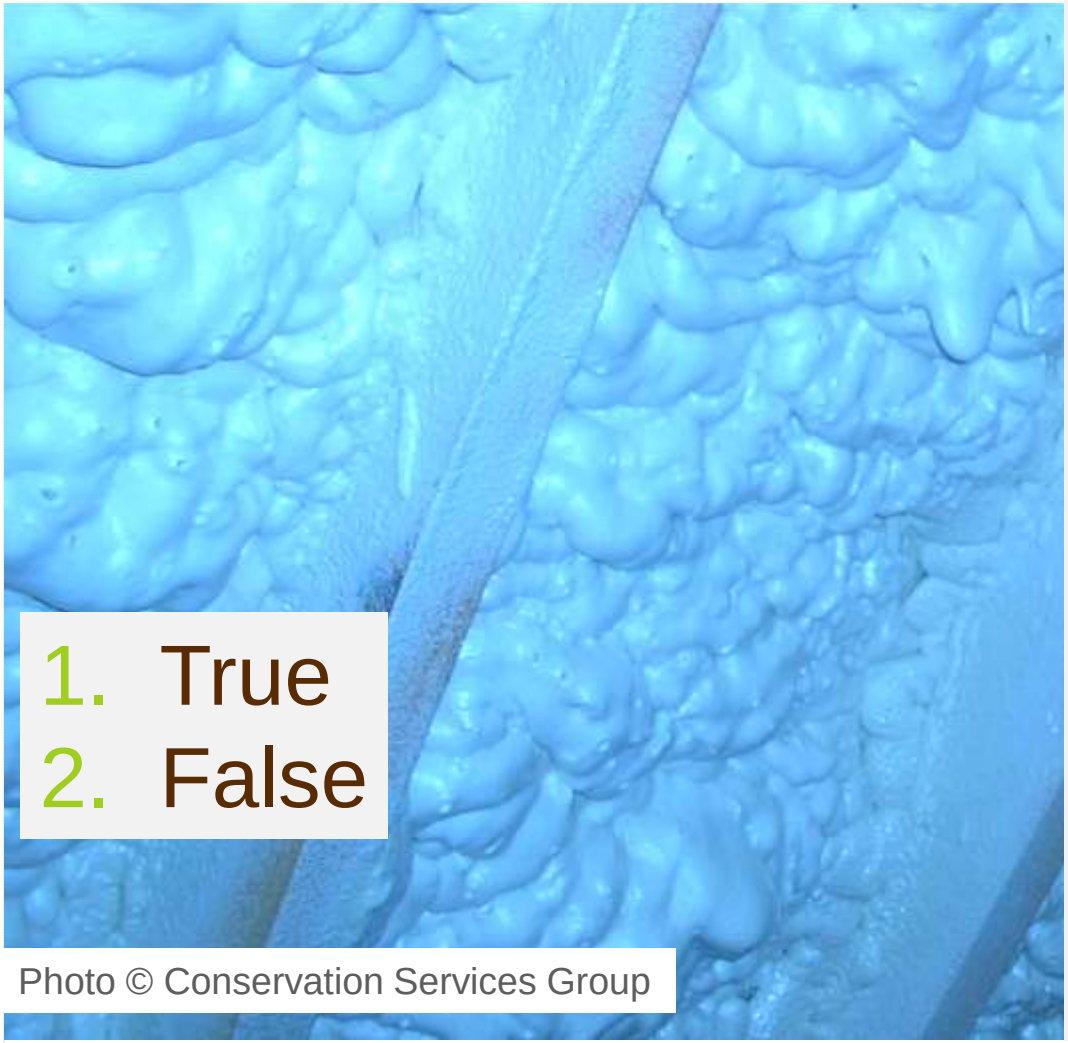
Bad Installation

Photo © Conservation Services Group

Good Installation

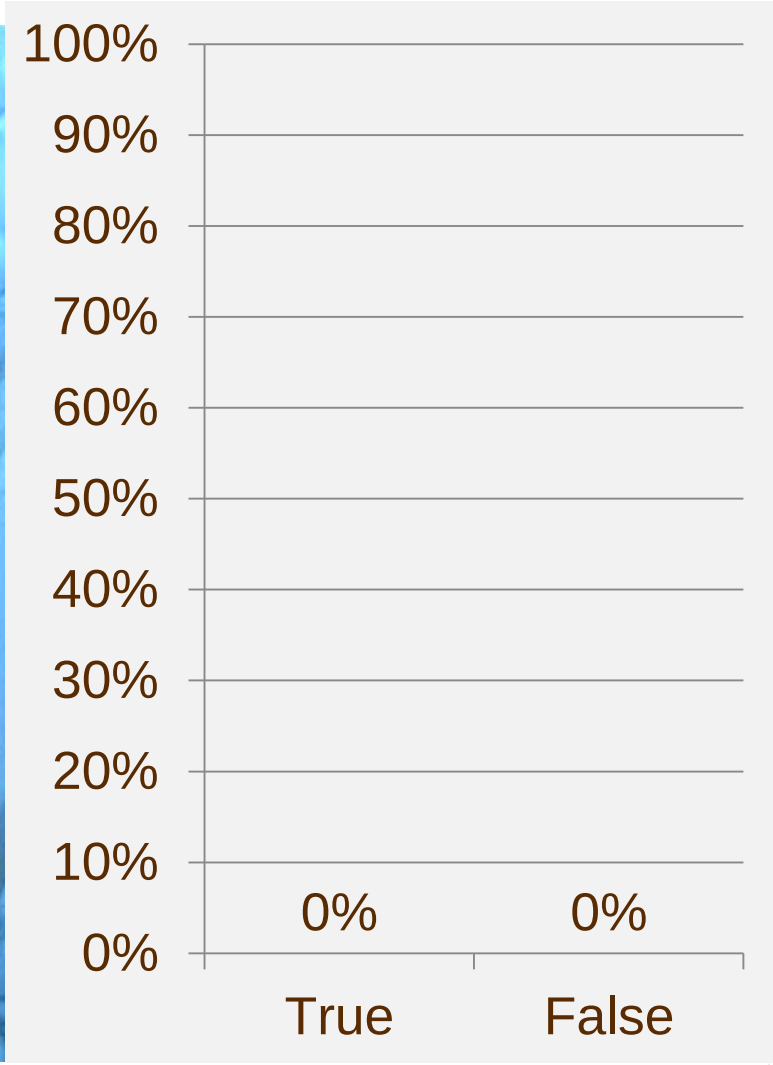
Photo © Conservation Services Group

Foam Solves All Problems?



1. True
2. False

Photo © Conservation Services Group



Bad Installation

Photo © Conservation Services Group

R402.4.1.2
Blower Door Testing (Mandatory)

Photo © Conservation Services Group

2012 IECC

R402.4.1.2
Air Leakage Testing (Mandatory)

R402.4.1.2	Blower Door Testing
2012 IECC	3 ACH50
Testing	By HERS Rater, HERS rating field inspector, an applicable BPI certified professional, or a BBRS certified 3rd party
Submittal	Written results submitted to code official
Test Conditions	When all penetrations are sealed

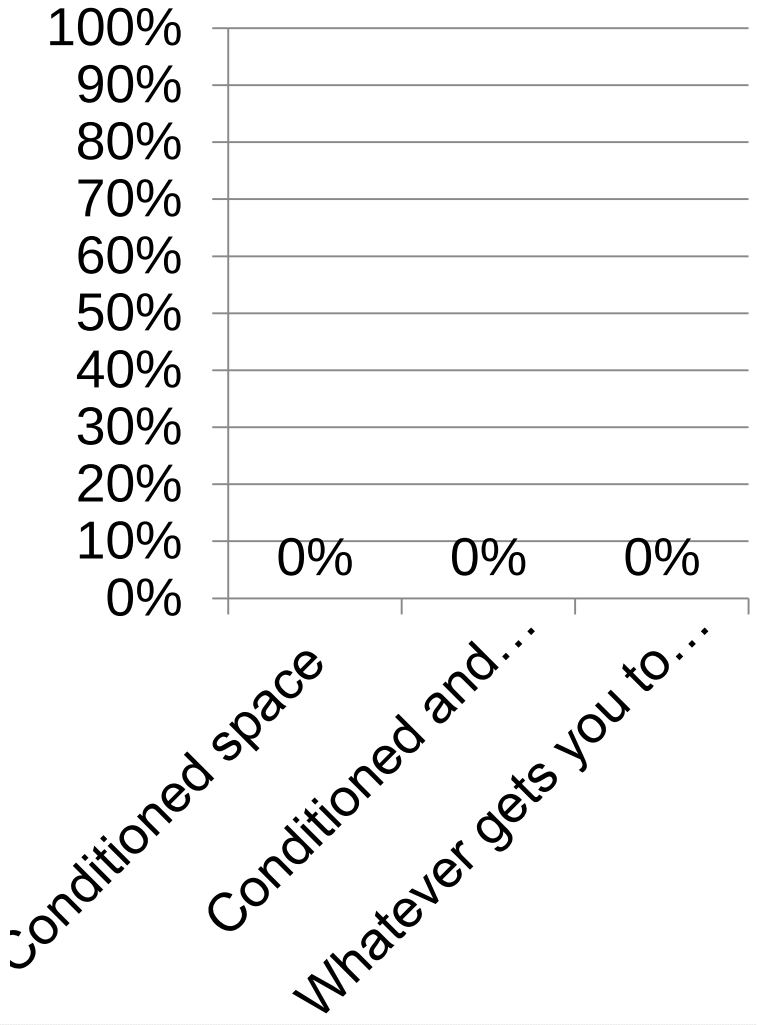
2012 IECC

ARS Question

- What defines the volume?

Conditioned Space:

An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent conditioned space



R402.4.1.2 Testing (Mandatory)

CFM50

What else do we need?

Blower Door Setup

1. Exterior Windows, doors and fireplaces shall be closed, but not sealed.
2. Dampers shall be closed but not sealed beyond intended infiltration control measures
3. Interior doors shall be open
4. Exterior doors for continuous ventilation or heat recovery systems shall be closed and sealed
5. Heating and cooling systems shall be turned off
6. Supply and return registers shall be fully open

2012 IECC

Air Leakage Metric

Air Changes/Hour @ 50 Pascal (ACH50)

$$ACH50 = \frac{CFM50 * 60}{Volume}$$

Information Needed

- CFM50 = 1,500 CFM50

- Volume of the home

$$Volume = 1{,}500\ ft^2 * 10 = 15{,}000\ ft^3$$

What is ACH50?

$$ACH50 = \frac{CFM50 * 60}{Volume}$$

$$ACH50 = \frac{715.6\ CFM * 60}{15{,}500\ ft^3} = 3.0\ ACH50$$

Passes 2009 IECC

CFM required for 2012 IECC?

Benchmarks

- 2009 IECC – 7 ACH50
- 2012 IECC – 3 ACH50
- ENERGY STAR Homes v3.1
  - Prescriptive - 3 ACH50
- Canadian R-2000 – 1.5 ACH50
- Passive House – 0.6 ACH50

IRC - Chapter 1 -R104.10 Modifications

Wherever there are *practical difficulties involved in carrying out the provisions of this code, the building official shall have the authority to grant modifications for individual cases*, provided the *building official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that *such modification does not lessen health, life and fire safety or structural requirements*. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

Controlling the Movement of Water, Air, and Heat

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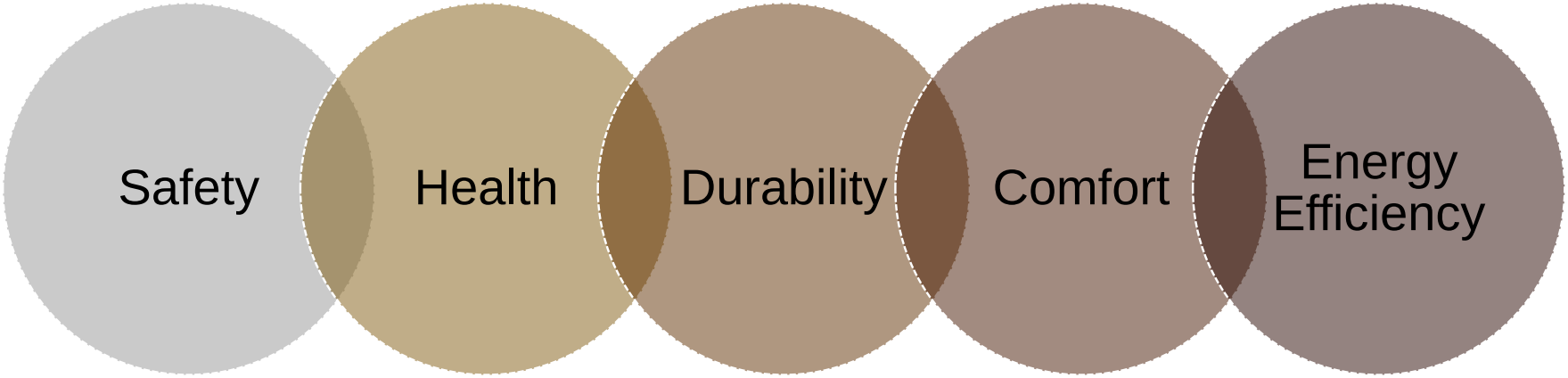
A Building is a System

- Enclosure
  - Control
    - Rain water
    - Water vapor
    - Air movement
    - Heat loss
  - Provide views to outside (windows)
  - Aesthetics

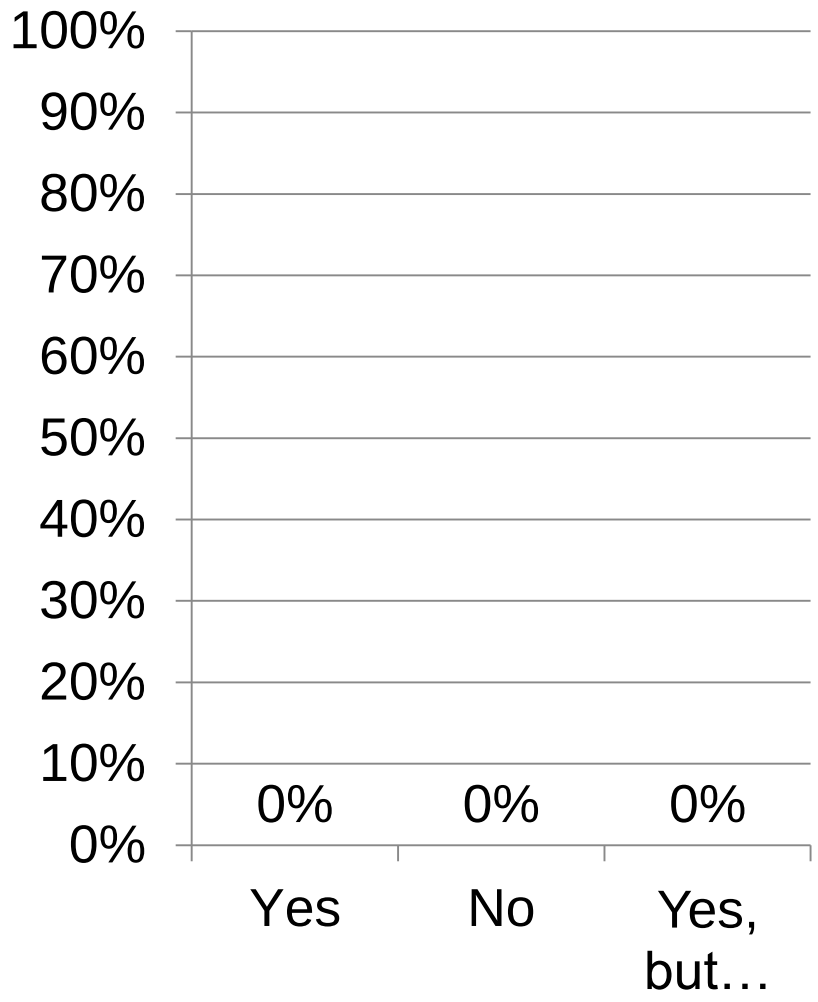
Priorities



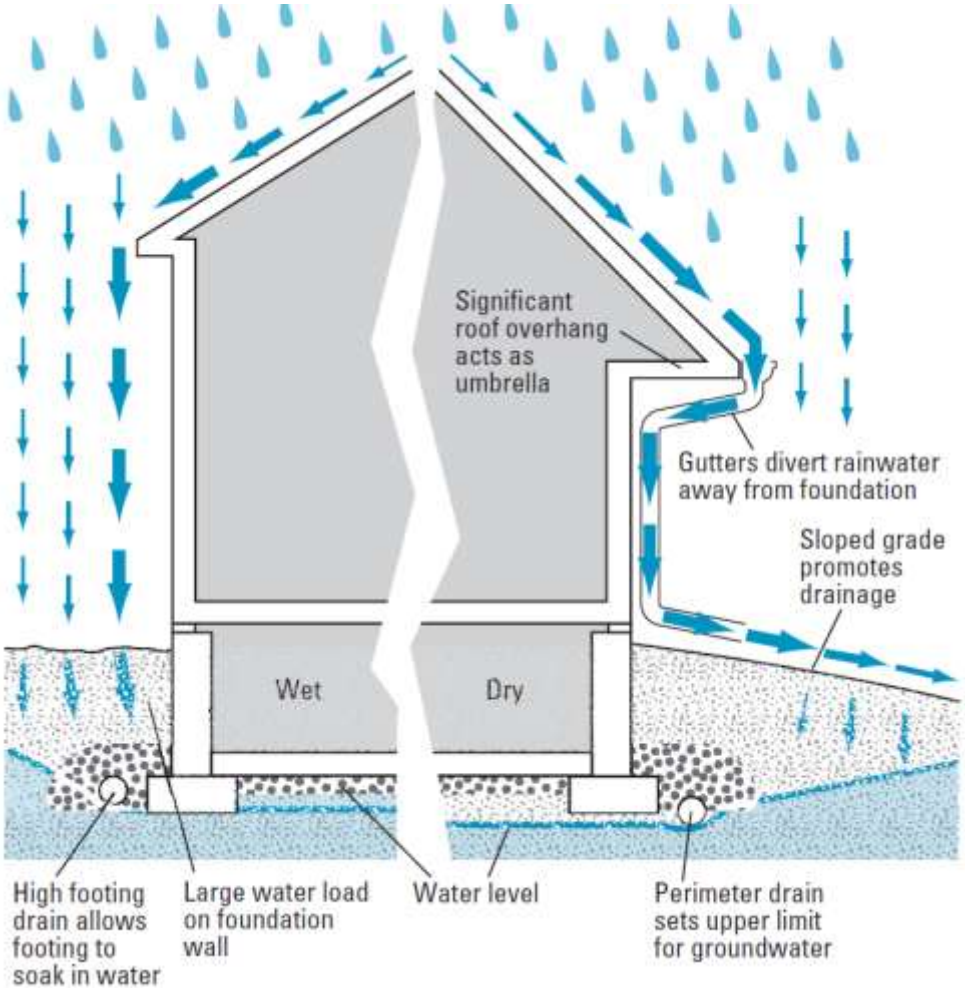
ARS Question

- Is poly an air barrier?

1. Yes
2. No
3. Yes, but…



Keep Bulk Water Out (Best Practice)



Rain

Plumbing leaks

Ground water

Durability (Best Practice)

Photo © Conservation Services Group

Durability (Best Practice)

Photo © Conservation Services Group

Water Vapor

Source is indoors

- Wet goes to dry
- Wet goes to cold
- **Moisture moves on air**

Photo © Conservation Services Group

Controlling Vapor

Photo © Conservation Services Group

Moisture + Food + Acceptable Temp =

Photo © Conservation Services Group

Moisture Control

Moisture Moves on Air

Photo © Conservation Services Group

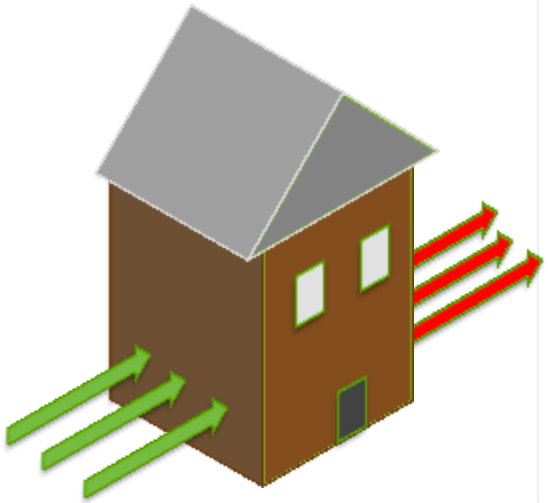
Why the Stripes?

Photo © Conservation Services Group

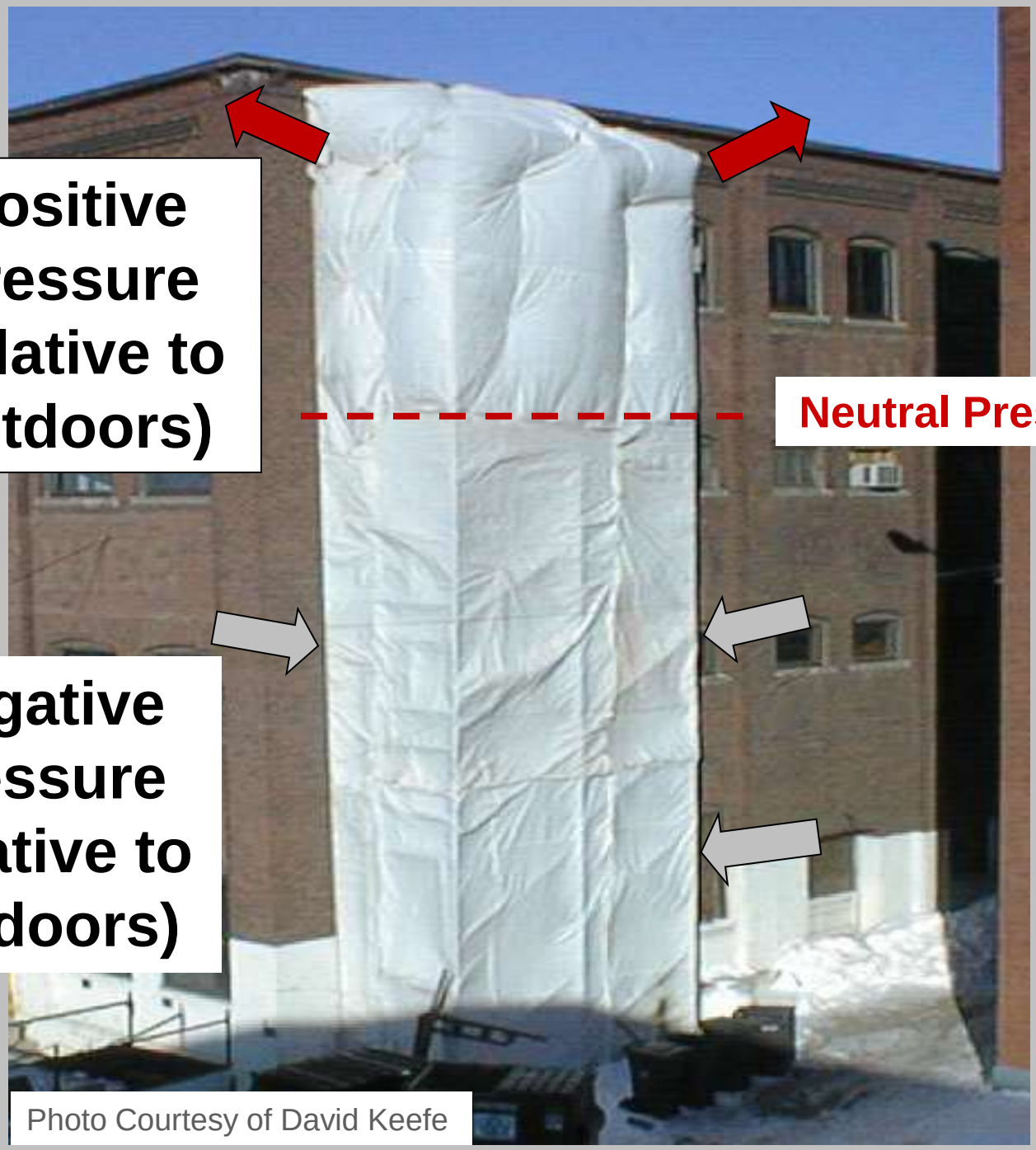
3 Modes of Air Transfer

stack effect

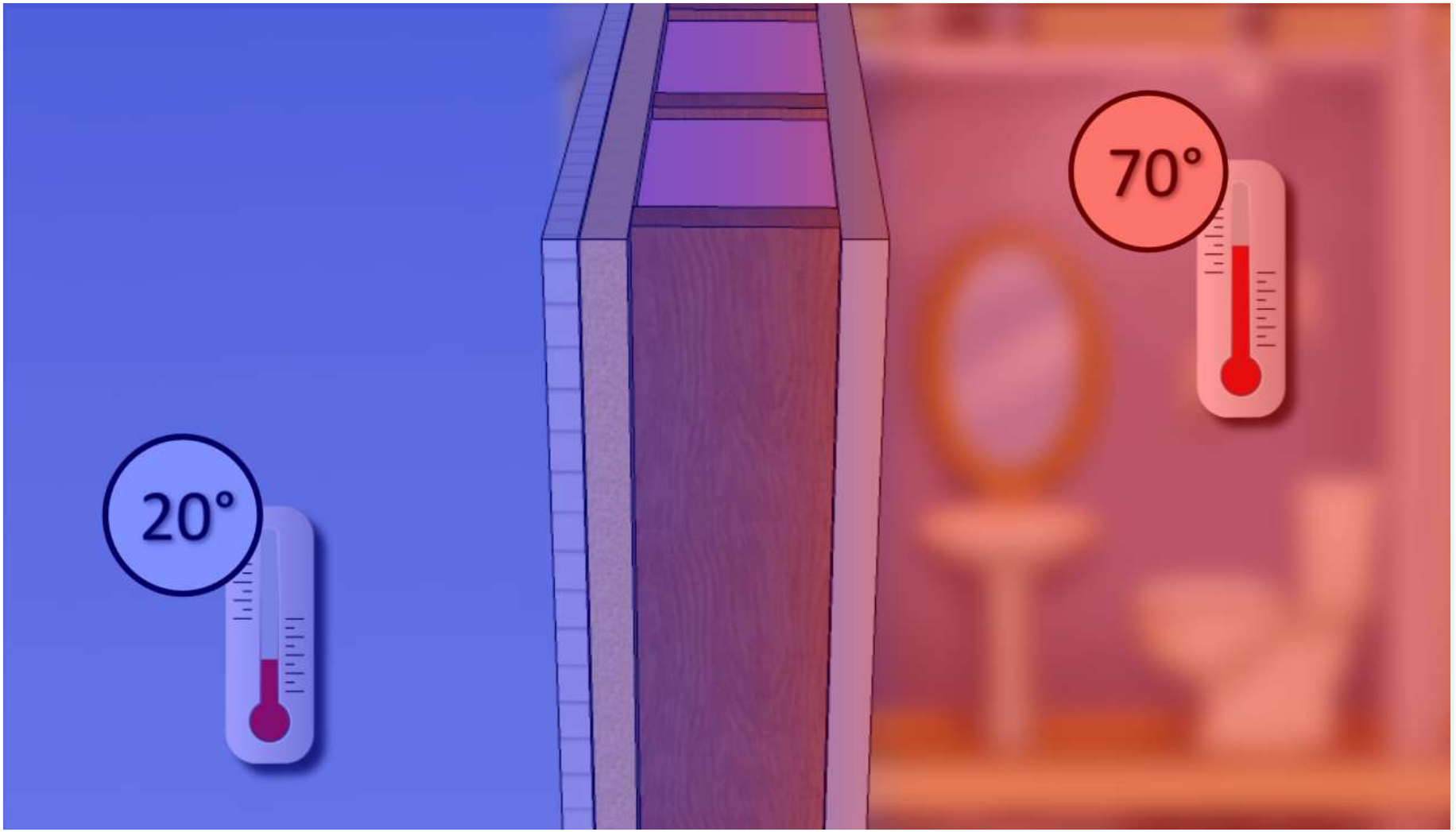
mechanical effect



wind effect


Positive pressure (relative to outdoors)
Neutral Pressure Plane
Negative pressure (relative to outdoors)
Photo Courtesy of David Keefe

Heat Transfer – Warm to Cold



Nice Finish, but What About the Heat Loss?

Photo © Conservation Services Group

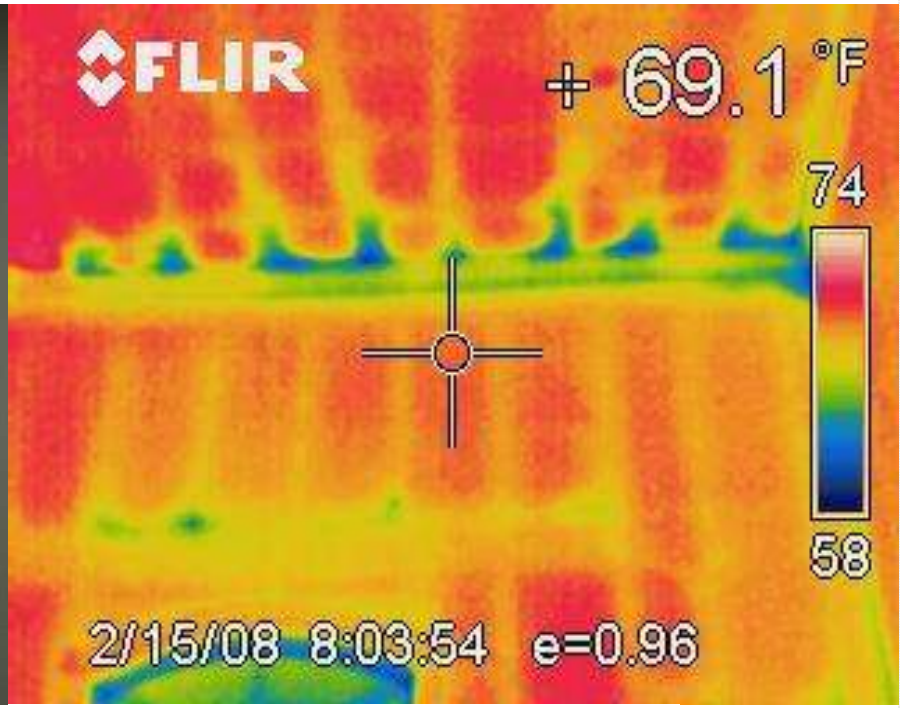


Photo © Conservation Services Group

Basement and Slabs

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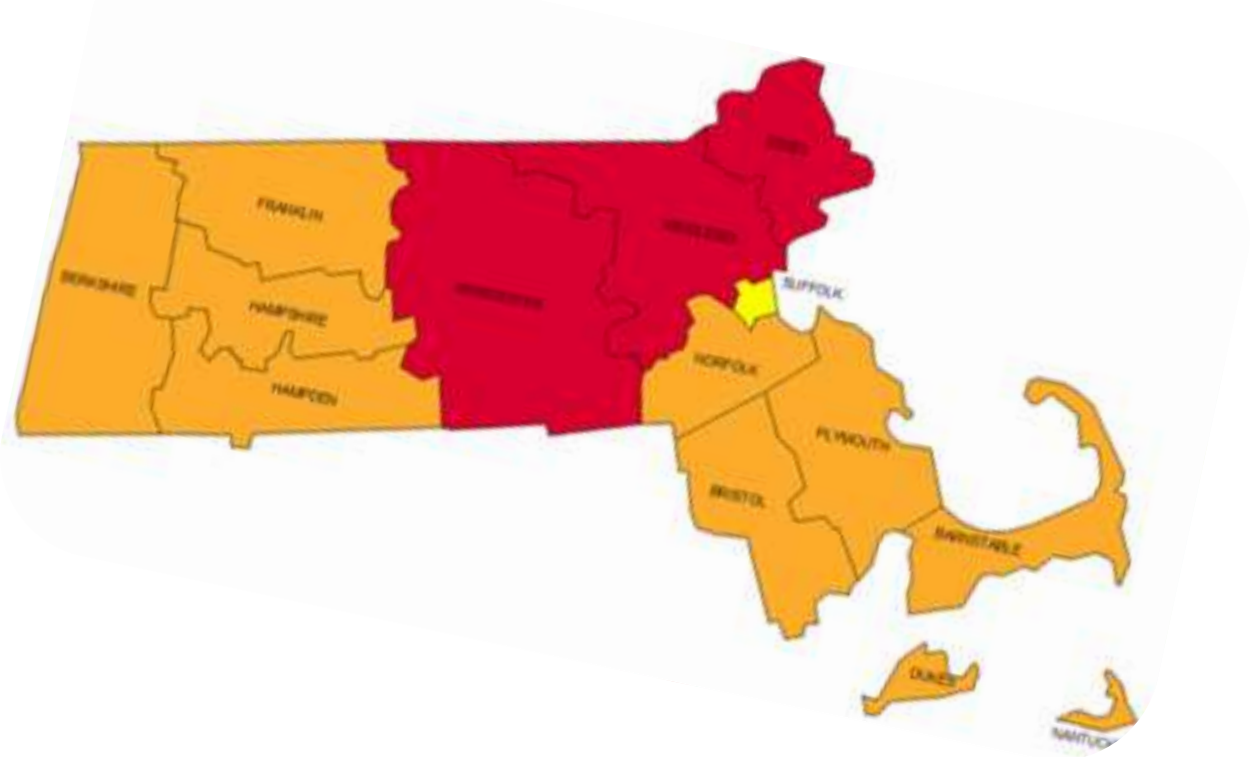
EPA MAP of Radon Zones



Zone 1

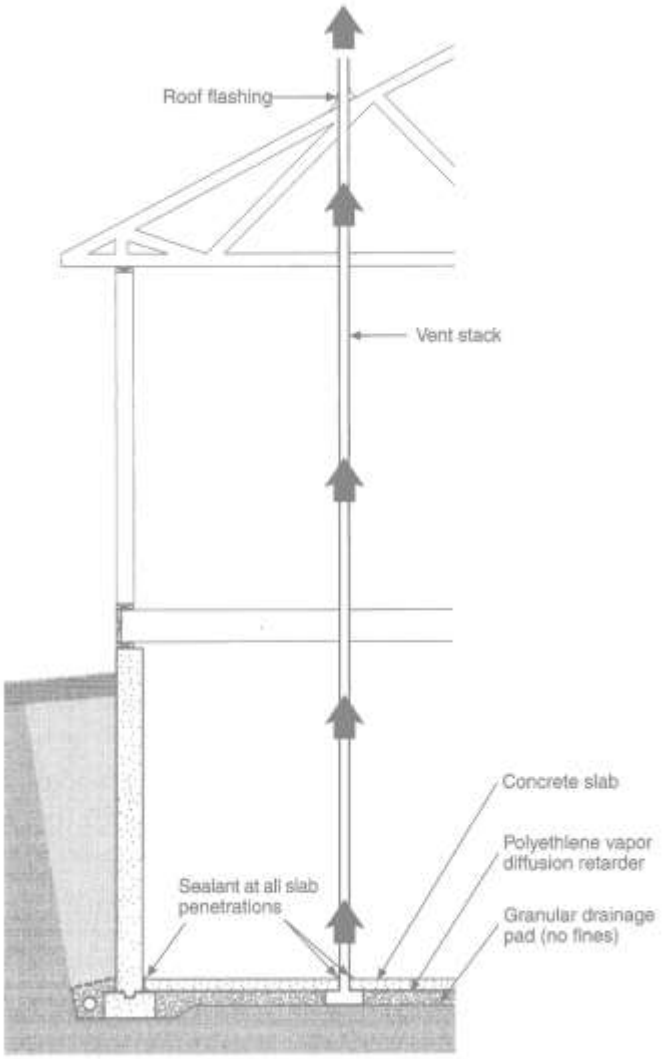
Zone 2

Zone 3

1/1/2015 - Passive Radon System required in Zone 1

Upcoming Code Changes – EPA Zone 1

- Amendment to 780 CMR
- New one- and two- family dwellings and townhouses of three stories or less
- No radon testing is required



Radon Control (MA Amendment)

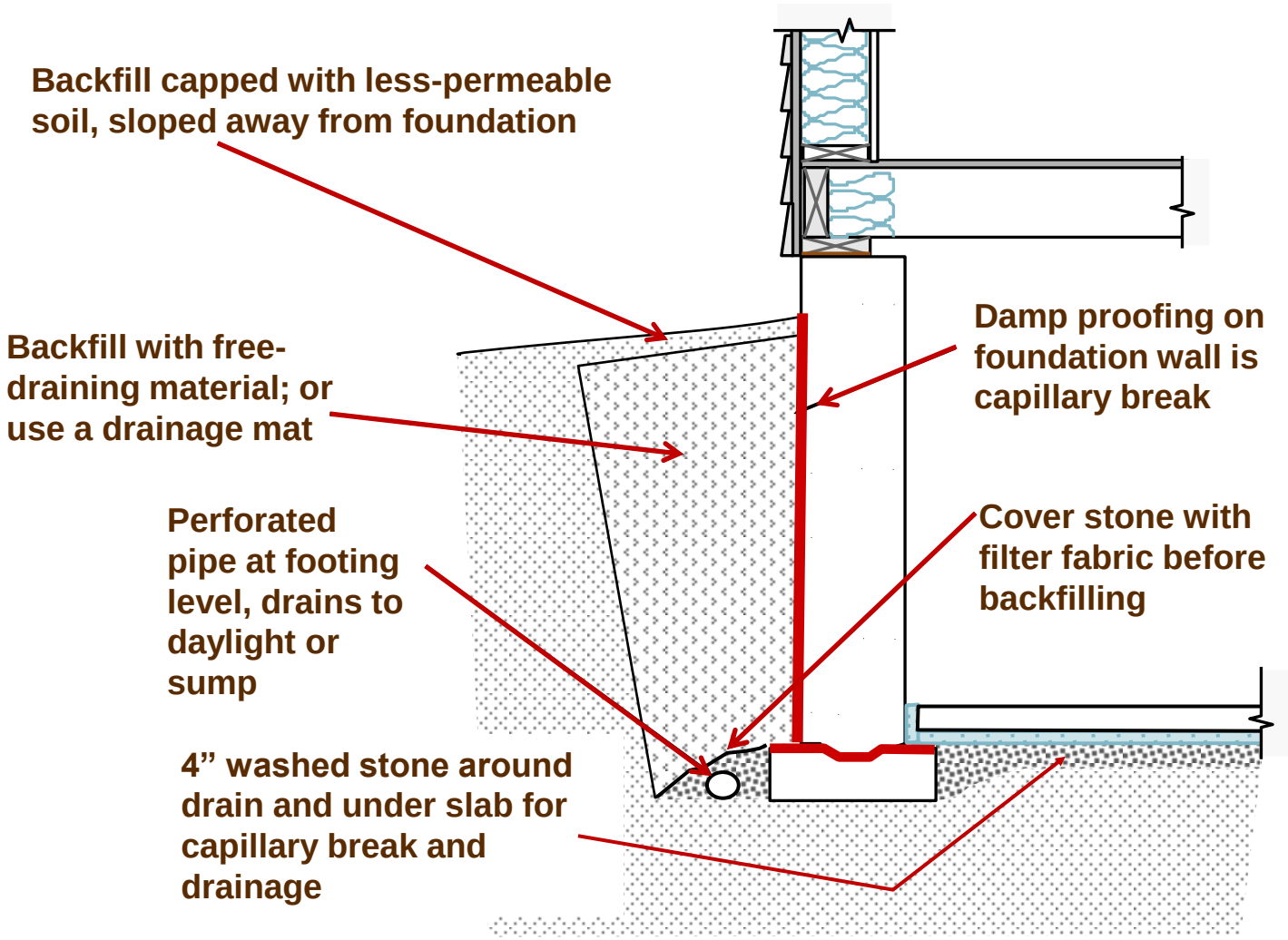
This pipe should be marked “Radon”

Photo © Conservation Services Group

What Can Defy Gravity?

2012 IECC

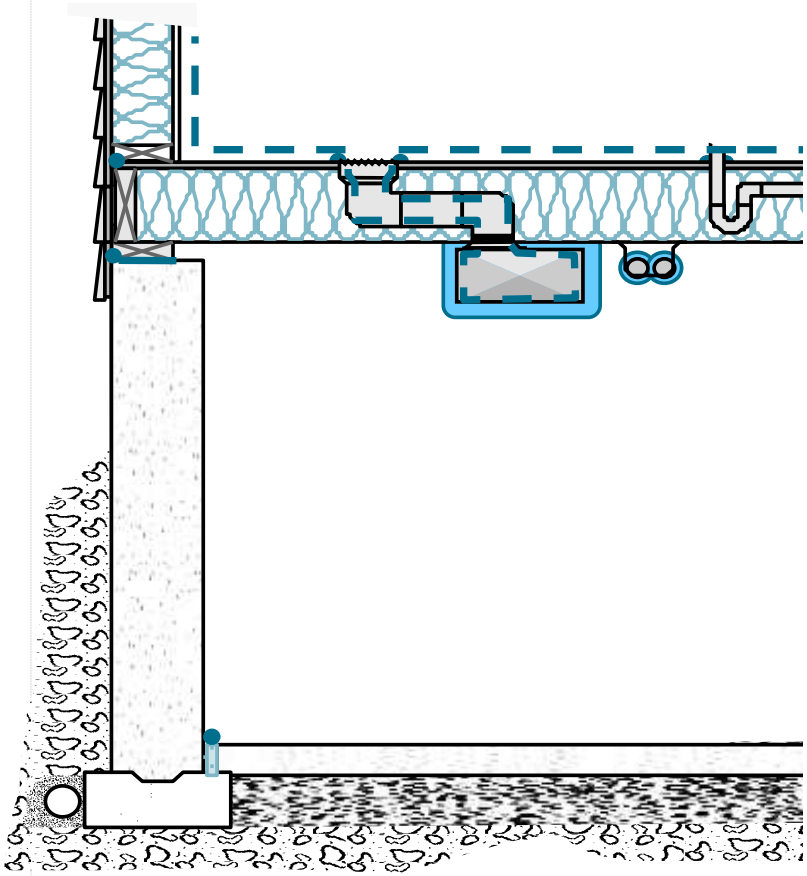
Exterior Water Control



IRC

2012 IECC

Unconditioned Basement (Prescriptive)



R402.1.1 (Table)
Floor: R-30 min
OR fill cavity (R-19 min.)

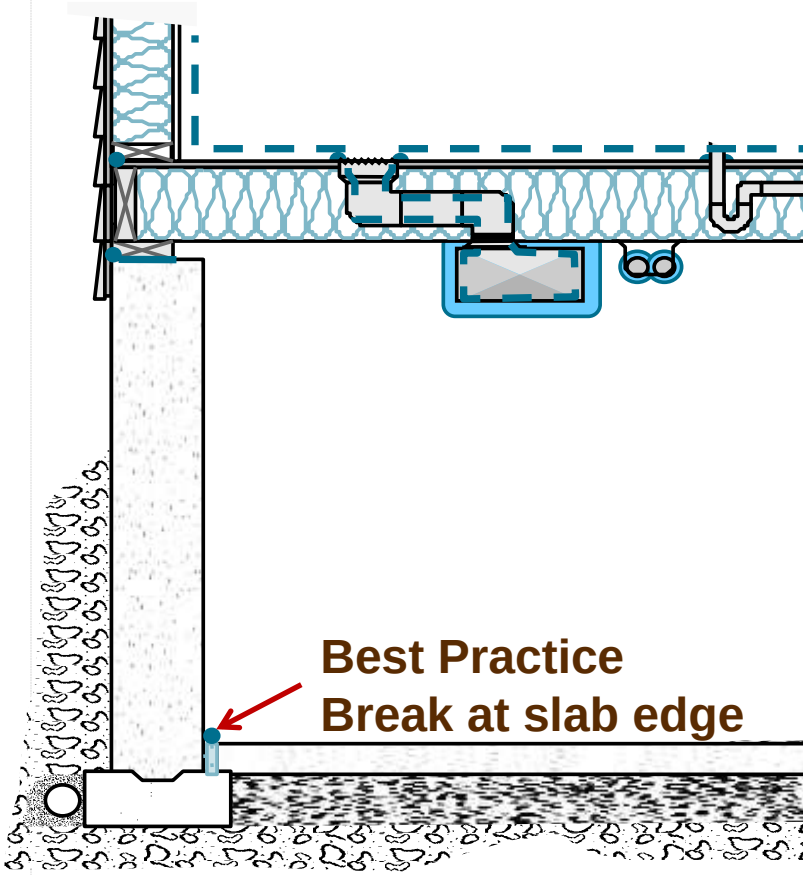
R403.2.1
Ducts: Insulate R-6

R403.4
DHW pipes: Insulate R-3

MA Field Guide

2012 IECC

Unconditioned Basement (Mandatory)



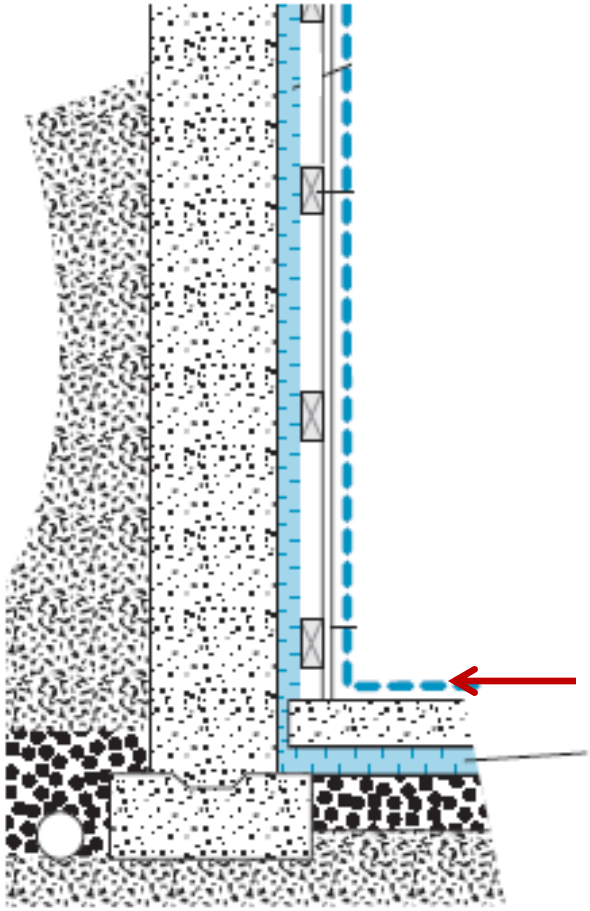
R403.2.2
Ducts: Sealed

R403.3
Mech. pipes: Insulate R-3

MA Field Guide

2012 IECC

R402.1.1 (Table)
Conditioned Basement (Prescriptive)



R-15 continuous OR

R-19 in the cavity

Extruded polystyrene insulation under slab and at slab edge to control condensation

2012 IECC

What's Happening?

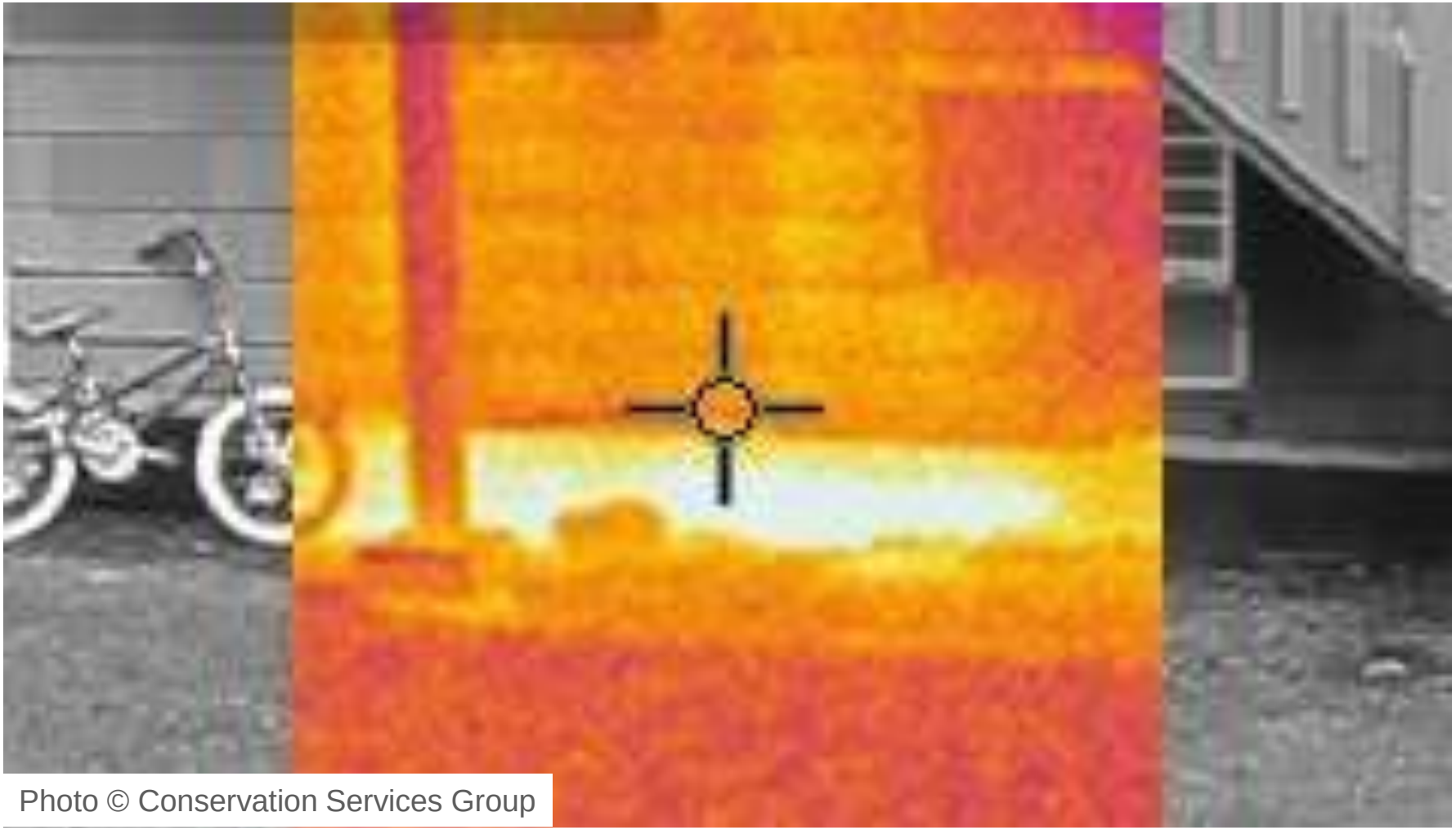
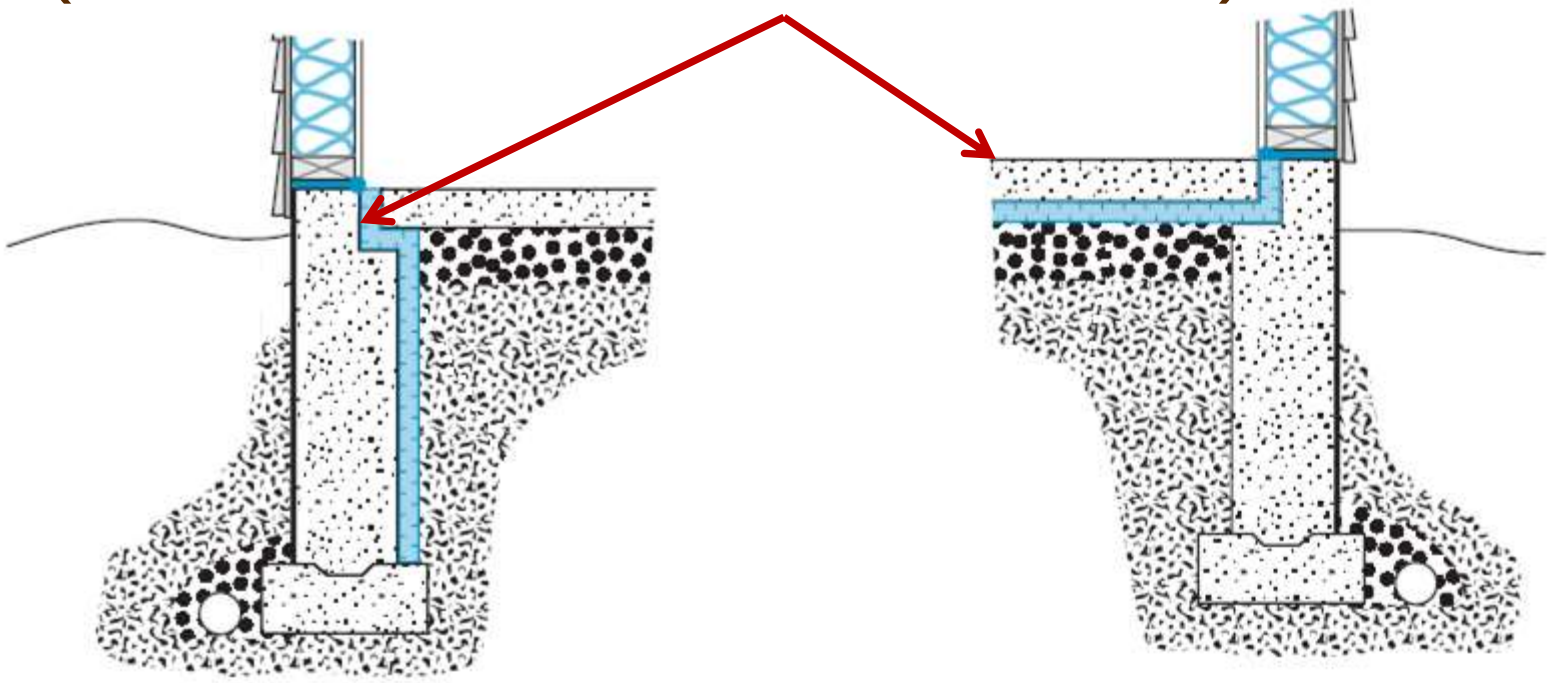


Photo © Conservation Services Group

R402.2.9 Slab-on-Grade Floors (Prescriptive)

2’ of R-10 either in any direction (horizontal/vertical/combination)



R-15 for heated slabs

R402.2.9 Slab-on-Grade Floors (Prescriptive)

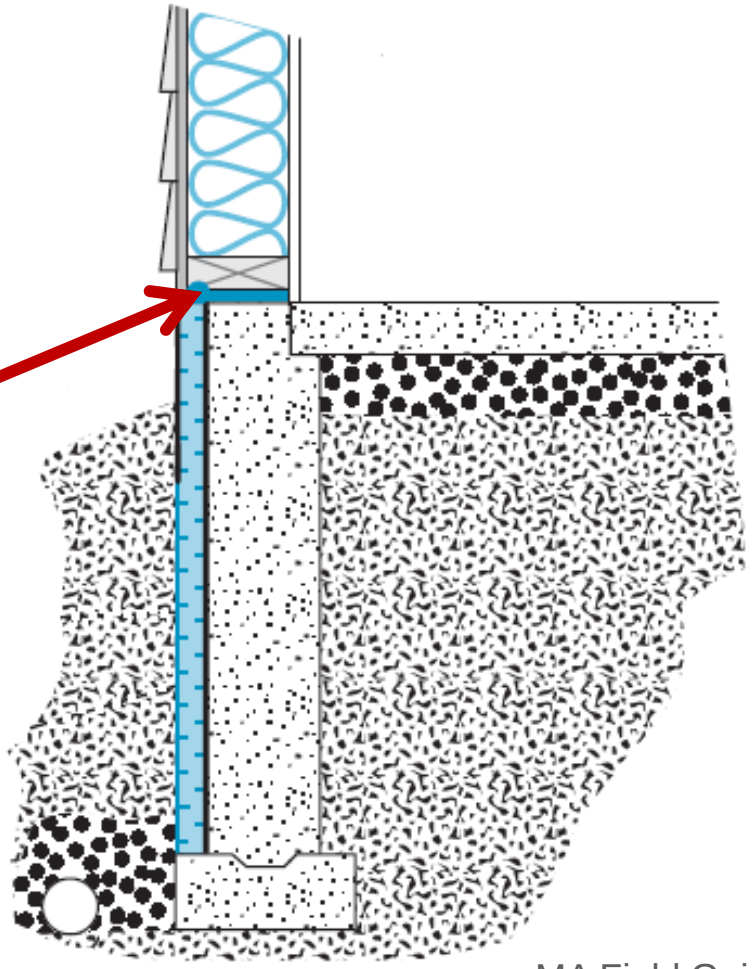
Photo © Conservation Services Group

2012 IECC

R402.2.9 Slab-on-Grade Floors (Prescriptive)

2’ of R-10

Protect insulation,
Install termite shield



R402.4.1.1 (Table)
Crawl Space Walls (Prescriptive)

Insulation permanently fastened

Floor to grade + 2’ vertically or horizontally

R15/19

Photo © Conservation Services Group

2012 IECC

Unconditioned Garage Converted to Family Room. What's required?

Photo © Conservation Services Group

Walls and Windows

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Bulk Water Protection

Proper Installation is Important

Photo © Conservation Services Group

Photo © Conservation Services Group

Roofs Concentrate Water

Photo © Conservation Services Group

Gutters Control Water

Photo © Conservation Services Group

2009 IRC R905.2.8.3 Sidewall Flashing

Water Gets Behind the Siding

Photo © Conservation Services Group

Best Practice - Vented Cladding

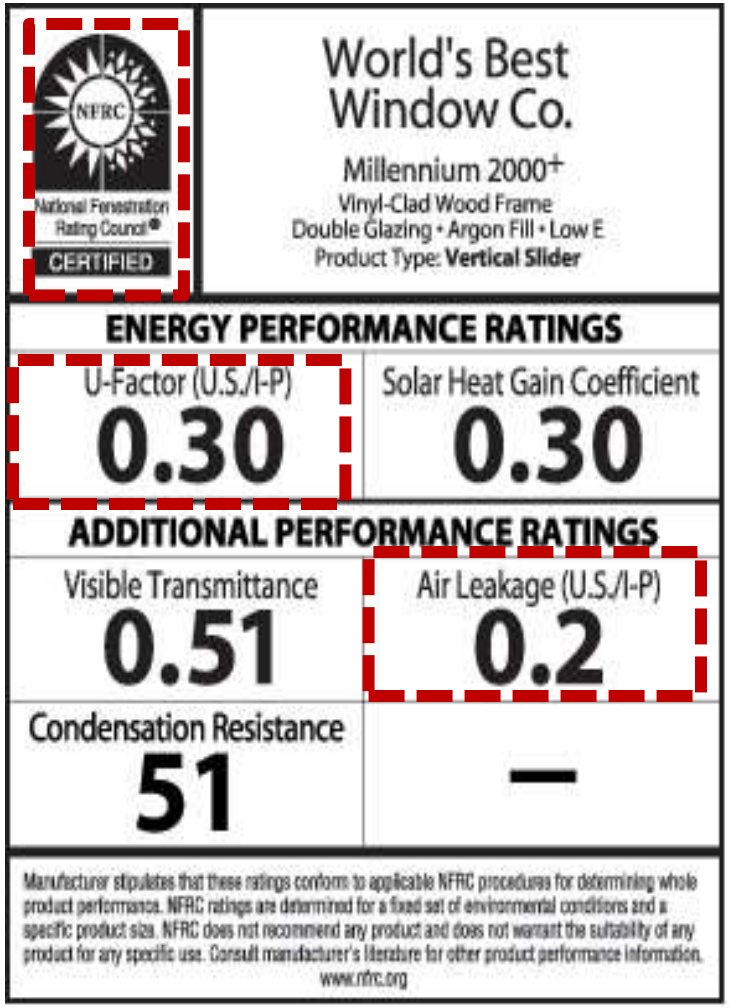
Photo © Conservation Services Group

Photo © Conservation Services Group

R402.4.3
Fenestration Air Leakage (Mandatory)

Air Leakage

- >0.3 CFM/sq ft windows, skylights& sliders
- >0.5 CFM/sq ft doors



2012 IECC

R402.3.3
Fenestration Exemption (Prescriptive)

- R-Value Table Exemptions*:
  - Up to 15 SF glazing
  - Up to 24 SF opaque door assembly
  - Glass only replacement (R101.4.3)
- New window / replacement window U <= 0.32 (R402.1.1 – Table)

*Does not apply to Total UA alternative (REScheck)

R402.5
Maximum Fenestration (Mandatory)

- Area-weighted average maximum U-factor allowed with tradeoffs: U-0.48

- UA Alternative

  RESCheck

- Performance

  HERS

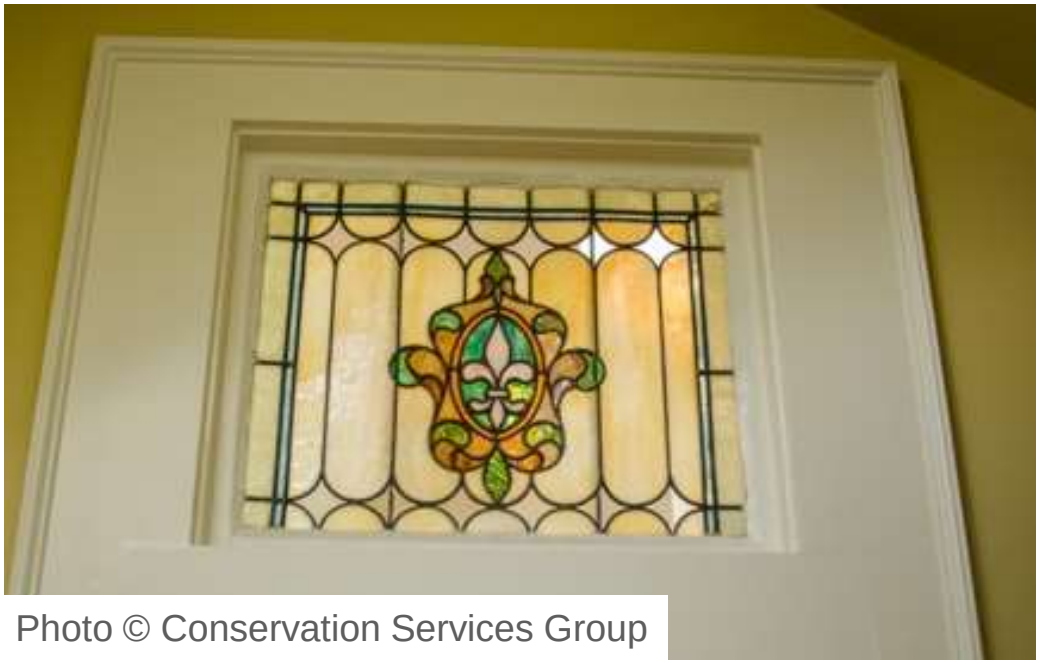


Photo © Conservation Services Group

2012 IECC

Ceilings

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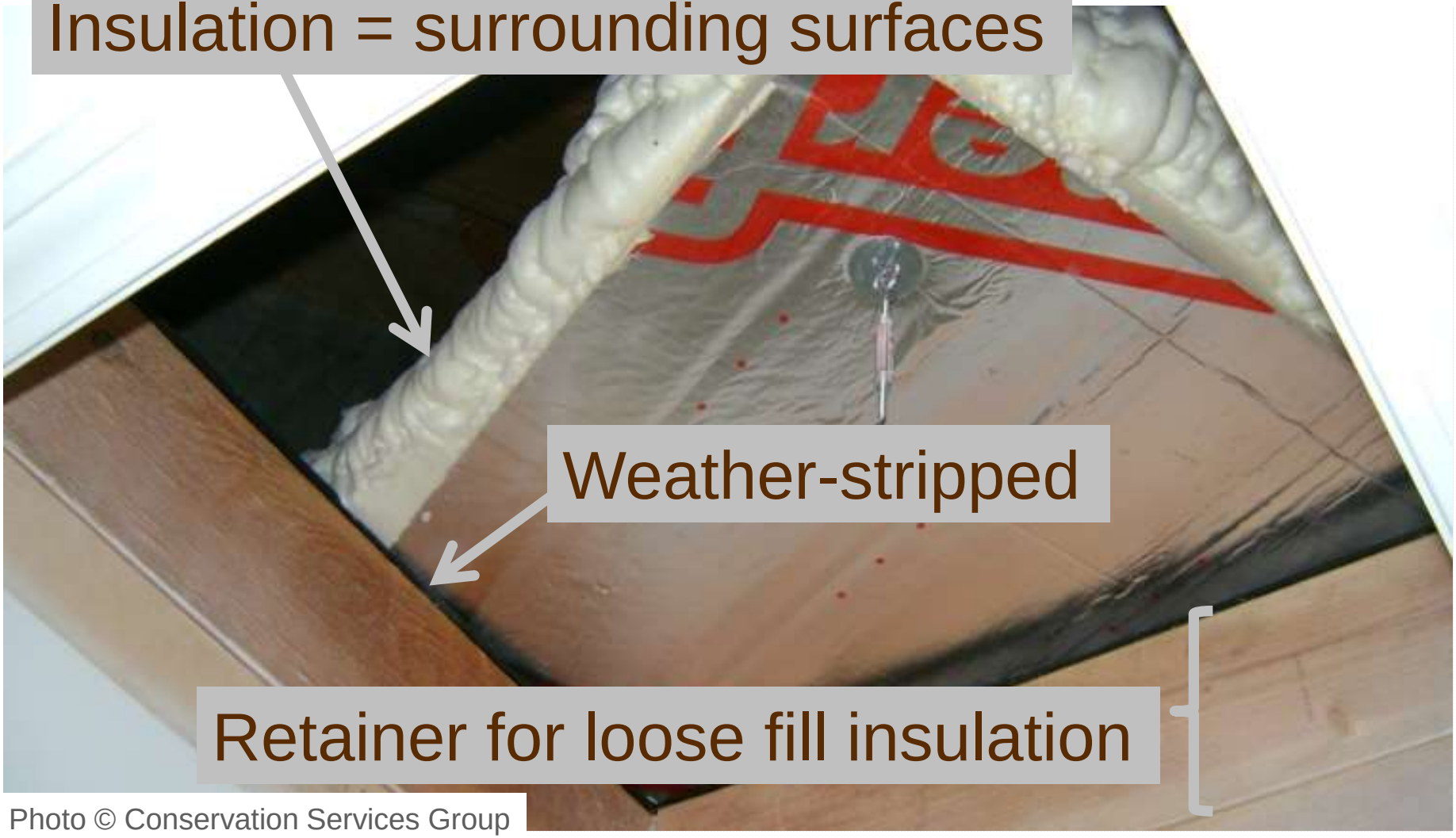
What is Missing?

Photo © Conservation Services Group

R402.2.3
Eave Baffles (Prescriptive)

Photo © Conservation Services Group

R402.2.4
Access Hatches and Doors (Prescriptive)



R402.2.4
Access Hatches and Doors (Prescriptive)

Access shall be provided to all equipment that prevents damaging or compressing the insulation.

Photo © Conservation Services Group

2012 IECC

R402.2.4
Access Hatches and Doors (Prescriptive)

R-49

Photo © Conservation Services Group

2012 IECC

Ice Dams

Photo © Conservation Services Group

2009 IRC R905.4.3.1
Ice Protection

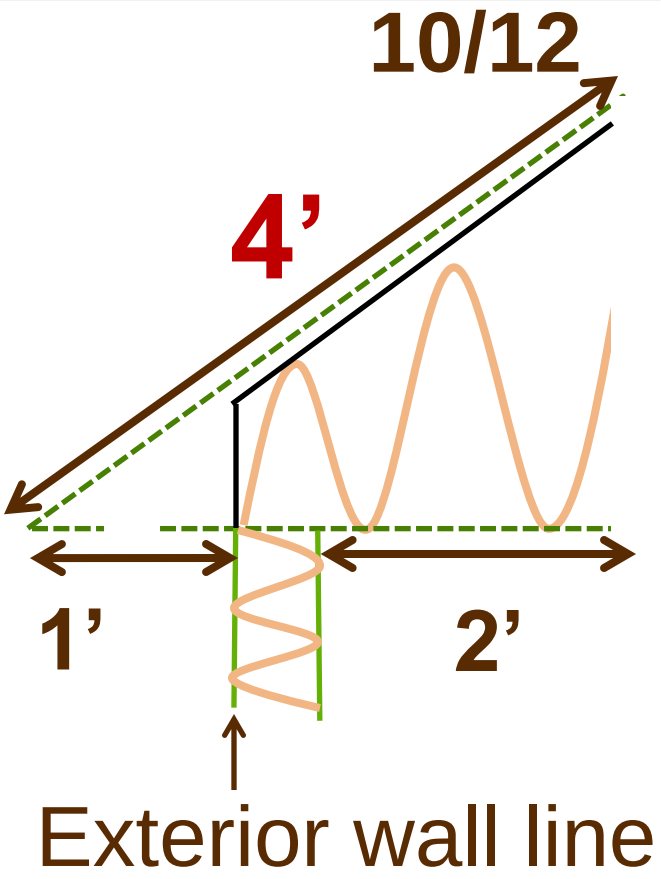


Table R402.4.1.1
Air Barrier (Mandatory)

- Strapped Ceilings?
  Blown is Best…

Photo © Conservation Services Group

Photo © Conservation Services Group

Table R402.4.1.1
Air Barrier (Mandatory)

- If You Must Strap, You Could…

Photo © Conservation Services Group

Photo © Conservation Services Group

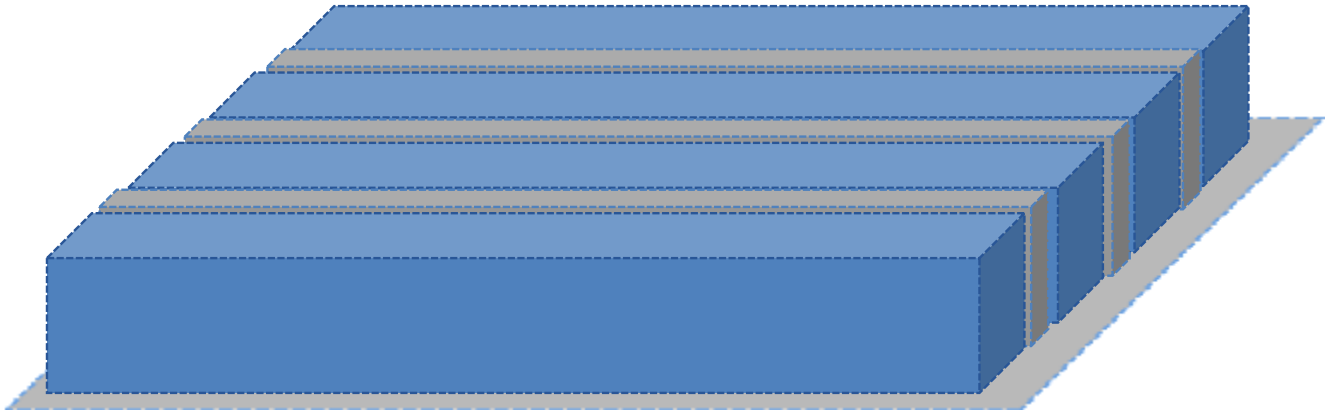
2012 IECC

Table R402.4.1.1
Air Barrier (Mandatory)

Photo © Conservation Services Group

Ceiling Assembly R-value

- R-49 attic insulation with 10” ceiling joists
- *10% framing factor*
- *Joists R-9.5*

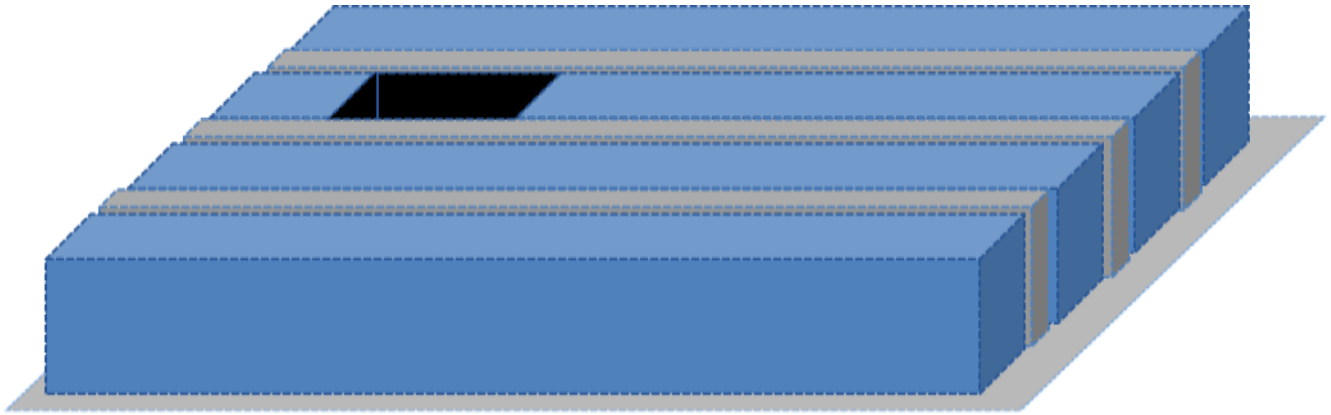


Assembly R-value = 35

Photo © Conservation Services Group

Ceiling Assembly R-value

- Add an uninsulated attic hatch (R-1)
- *10 square feet*



Overall R-value = 26

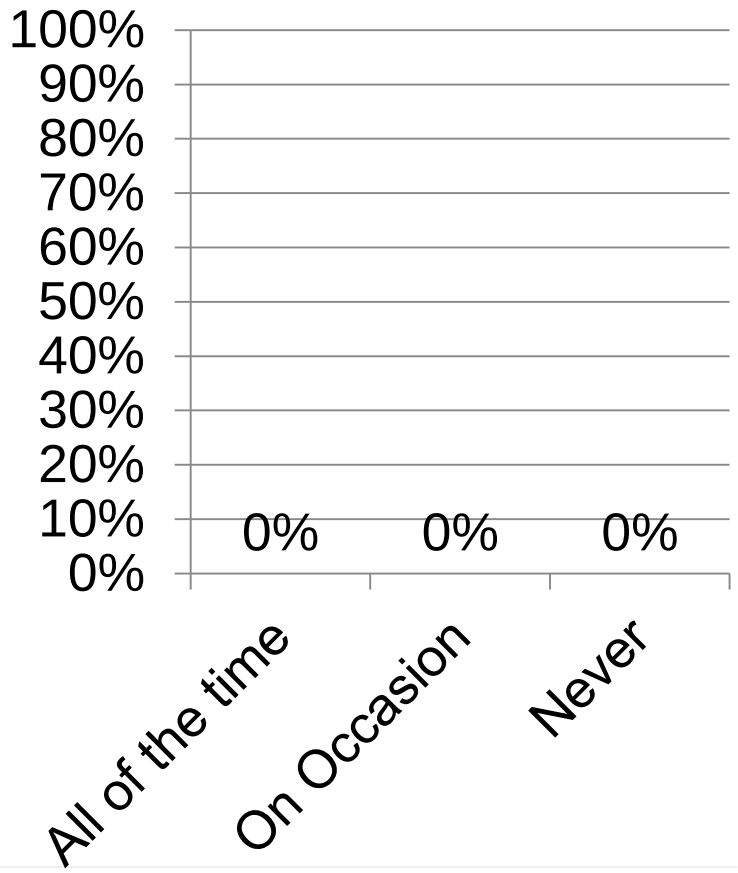
- 500 SQUARE FOOT EXCEMPTION

REScheck
Prescriptive Path Compliance

- Insulation and window trade-off calculations
- UA: U-factor times assembly area
- Building thermal envelope
- Include the thermal bridging effects of framing materials

- How often do you use/require REScheck for compliance?

1. All of the time
2. On Occasion
3. Never



REScheck

Defining UA

- U-factor x Area= UA
- Find UA of individual components of building envelope:
  - Windows
  - Doors
  - Wall
  - Floor
  - Ceiling
- U-factor= 1/R-value

REScheck Inputs

	Component	Assembly	Gross Area		Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	UA
	Building							
1	Cond> unc bsmnt	All-Wood Joist/Truss:Ove...	2486	ft2	30.0	0.0	0.033	82
2	Cond>amb	Wood Frame, 16" o.c.	2155	ft2	13.0	7.5	0.049	86
3	Window 1	Vinyl Frame:Double Pane ...	350	ft2			0.35	122
4	Door 1	Solid	38	ft2			0.3	11
5	Door 2	Solid	17	ft2			0.3	5
6	Cond>garage	Wood Frame, 16" o.c.	281	ft2	13.0	7.5	0.049	14
7	Cond> unc bsmnt	Wood Frame, 16" o.c.	116	ft2	13.0	0.0	0.082	10
8	Cond>attic	Wood Frame, 16" o.c.	292	ft2	20.0	0.0	0.059	17
9	Unc bsmnt>amb	Wood Frame, 16" o.c.	223	ft2	20.0	0.0	0.059	11
10	Window 2	Vinyl Frame:Double Pane ...	23	ft2			0.35	8
11	Door 3	Solid	14	ft2			0.3	4
12	Flat	Flat Ceiling or Scissor Truss	716	ft2	38.0	0.0	0.03	21
13	Sloped	Cathedral Ceiling	722	ft2	38.0	0.0	0.027	19

Sample REScheck Output

Compliance: Passes using UA trade-off

Compliance: **0.2% Better Than Code** Maximum UA: **411** Your UA: **410**

The % Better or Worse Than Code Index reflects how close to compliance the house is based on code trade-off rules.
It DOES NOT provide an estimate of energy use or cost relative to a minimum-code home.

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Glazing or Door U-Factor	UA
Cond> unc bsmnt: All-Wood Joist/Truss:Over Unconditioned Space	2,486	30.0	0.0	0.033	82
Cond>amb: Wood Frame, 16" o.c.	2,155	13.0	7.5	0.049	86
Window 1: Vinyl Frame:Double Pane with Low-E	350			0.350	122
Door 1: Solid	38			0.300	11
Door 2: Solid	17			0.300	5
Cond>garage: Wood Frame, 16" o.c.	281	13.0	7.5	0.049	14
Cond> unc bsmnt: Wood Frame, 16" o.c.	116	13.0	0.0	0.082	10
Cond>attic: Wood Frame, 16" o.c.	292	20.0	0.0	0.059	17
Unc bsmnt>amb: Wood Frame, 16" o.c.	223	20.0	0.0	0.059	11
Window 2: Vinyl Frame:Double Pane with Low-E	23			0.350	8
Door 3: Solid	14			0.300	4
Flat: Flat Ceiling or Scissor Truss	716	38.0	0.0	0.030	21
Sloped: Cathedral Ceiling	722	38.0	0.0	0.027	19

REScheck Requirements

Air Leakage:		
1	☑	[402.4.1.1] Air barrier and thermal barrier installed per manufacturer's instructions.
2	☒	[402.4.3] Fenestration that is not site built is listed and labeled as meeting AAMA /WDMA/CSA 101/I.S.2/A440 or has infiltration rates per NFRC 400 that do not exceed code limits.
3	☒	[402.4.4] IC-rated recessed lighting fixtures sealed at housing/interior finish and labeled to indicate ≤2.0 cfm leakage at 75 Pa.
4	☑	[403.5] Automatic or gravity dampers are installed on all outdoor air intakes and exhausts.
5	☑	[402.4.1.2] Blower door test @ 50 Pa. <=5 ach in Climate Zones 1-2, and <=3 ach in Climate Zones 3-8.
Fenestration:		
1	☒	[303.1.3] U-factors of fenestration products are determined in accordance with the NFRC test procedure or taken from the default table.
Insulation:		
1	☒	[303.2.1] A protective covering is installed to protect exposed exterior insulation and extends a minimum of 6 in. below grade.
2	☑	[303.1] All installed insulation is labeled or the installed R-values provided.
3	☒	[303.2, 402.2.7] Floor insulation installed per manufacturer's instructions, and in substantial contact with the underside of the subfloor.
4	☑	[303.2] Wall insulation is installed per manufacturer's instructions.
5	☑	[303.1.1.1, 303.2] Ceiling insulation installed per manufacturer's instructions. Blown insulation marked every 300 ft².
6	☒	[402.2.3] Vented attics with air permeable insulation include baffle adjacent to soffit and eave vents that extends over insulation.
7	☒	[402.2.4] Attic access hatch and door insulation ≥R-value of the adjacent assembly.
Plan Review:		
1	☒	[103.1, 103.2] Construction drawings and documentation demonstrate energy code compliance for the building envelope.
Post Construction:		
1	☒	[401.3] Compliance certificate posted.

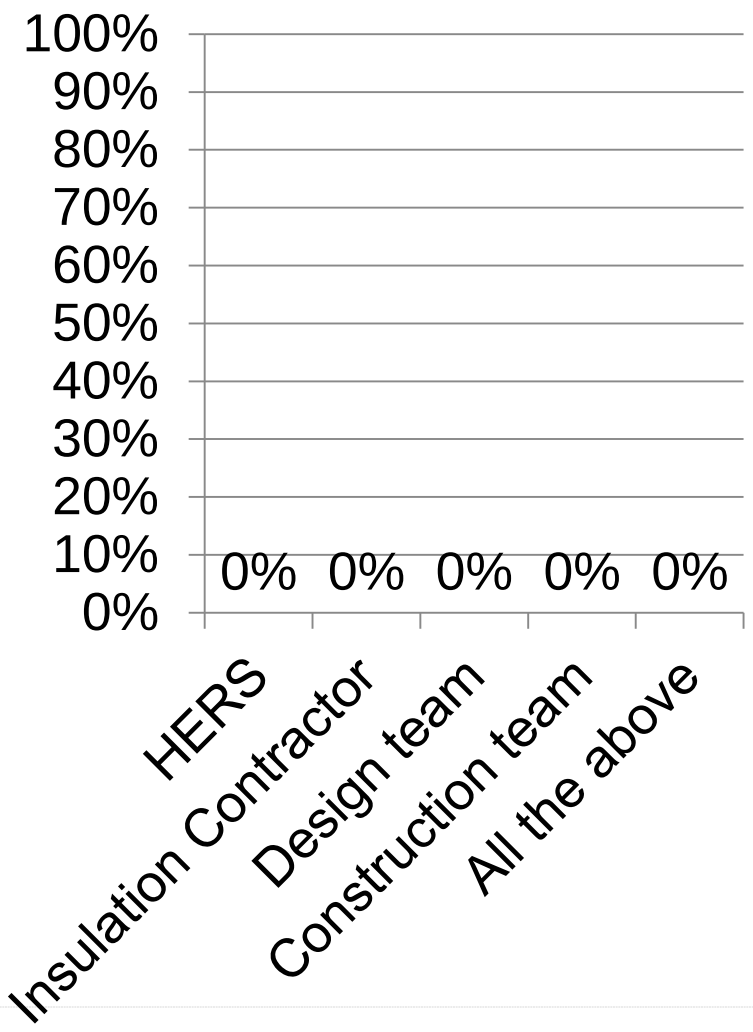
Inputs Review

- Calculate R-value using listed U-values
- Window area 10-22% of the wall area
- Ceiling area cover the floor area
- Wall area and floor area typically within 25% of each other

ARS Question

Who can submit a REScheck?

1. HERS
2. Insulation Contractor
3. Design team
4. Construction team
5. All the above



Air Barrier and Insulation Installation Review

2012 IECC Table R402.4.1.1

Conservation Services Group

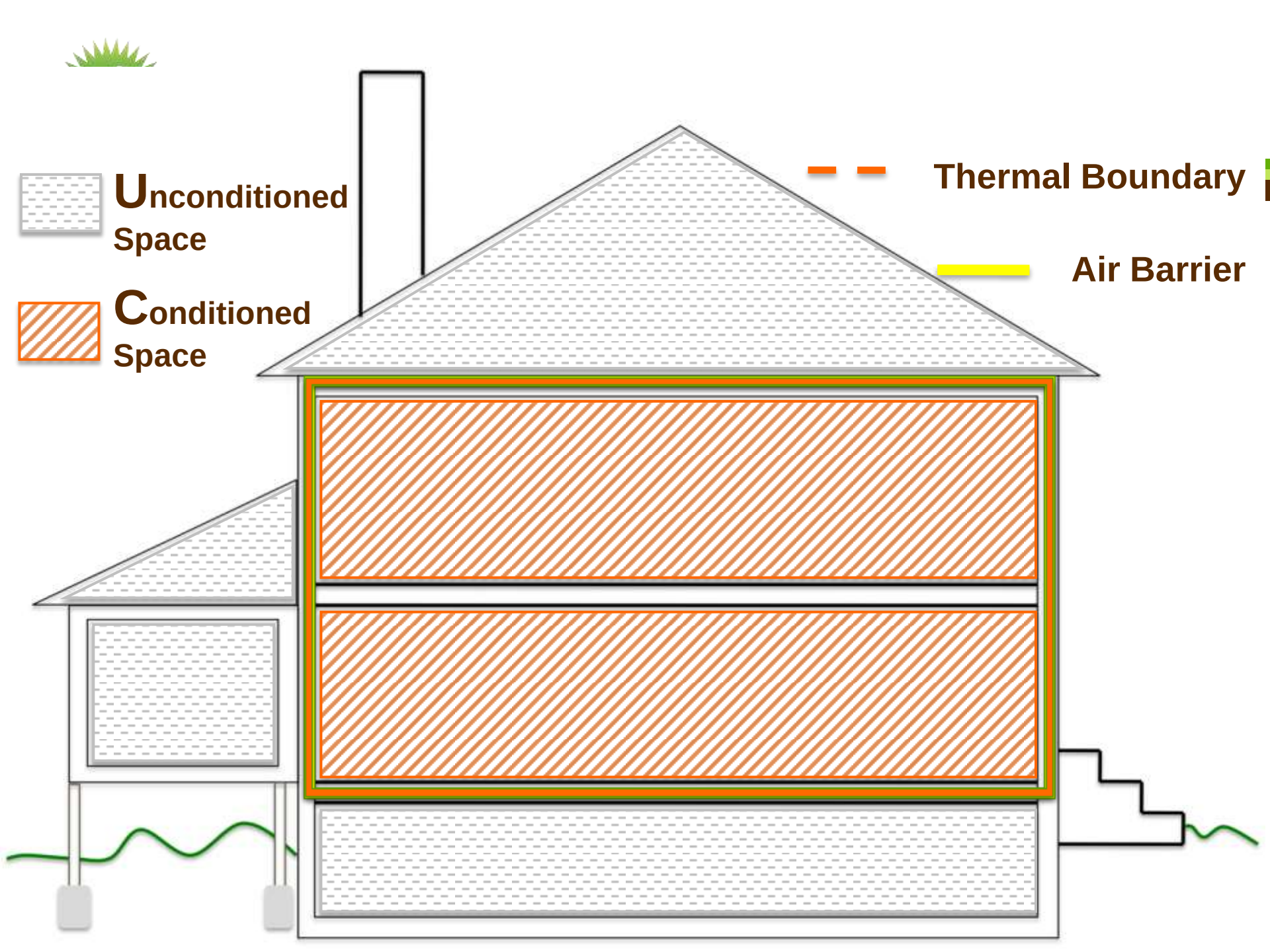
mass save®
Savings through energy efficiency

So Where are the Leaks?

Photo © Conservation Services Group

R402.4
Air Leakage (Mandatory)

2009 IECC	2012 IECC
Air Barrier & Insulation Installation Table	**Air Barrier & Insulation Installation Table**
OR	***AND***
Blower Door Test 7 ACH50	**Blower Door Test 3 ACH50**


Unconditioned Space
Conditioned Space
Thermal Boundary
Air Barrier

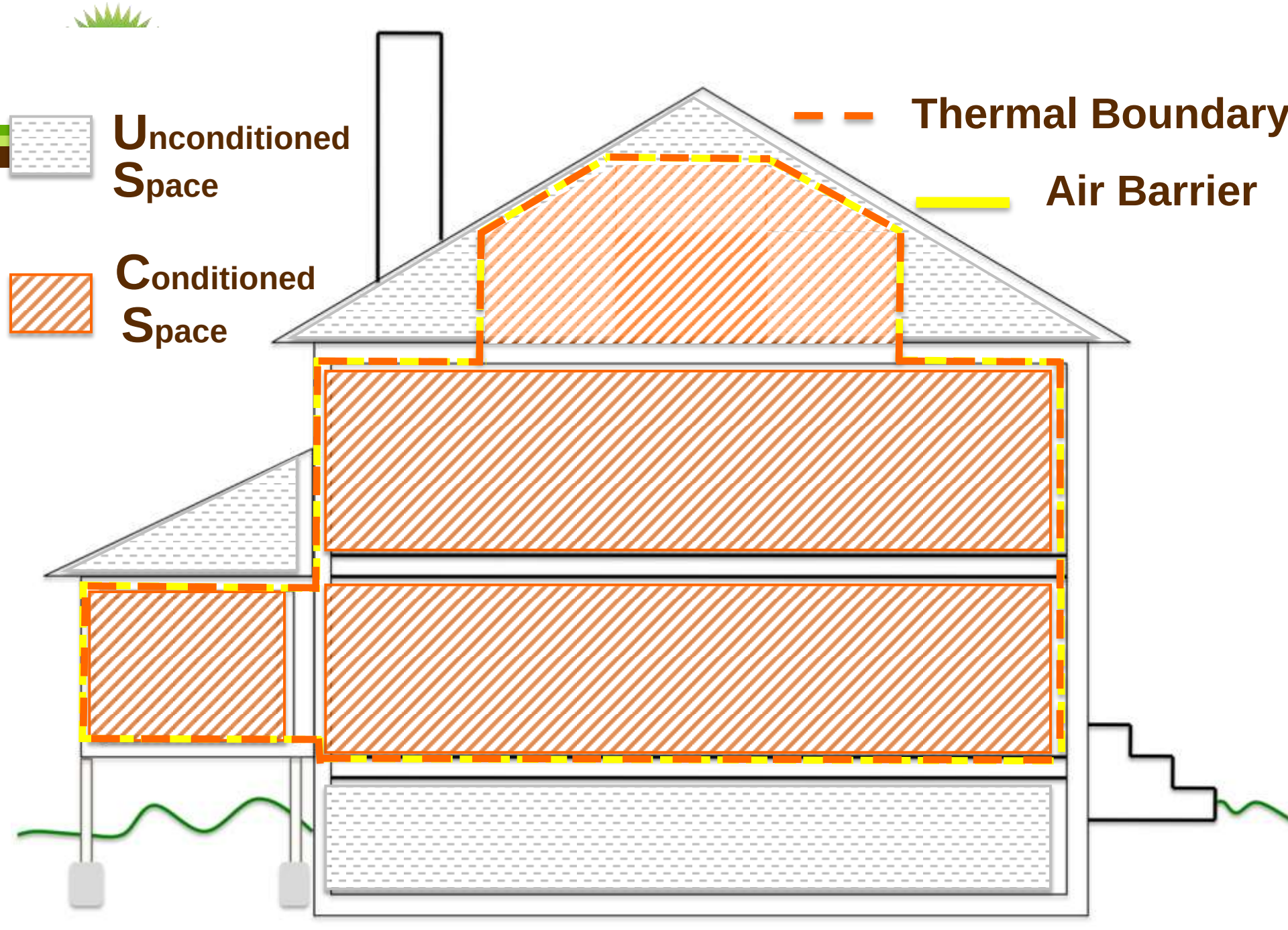
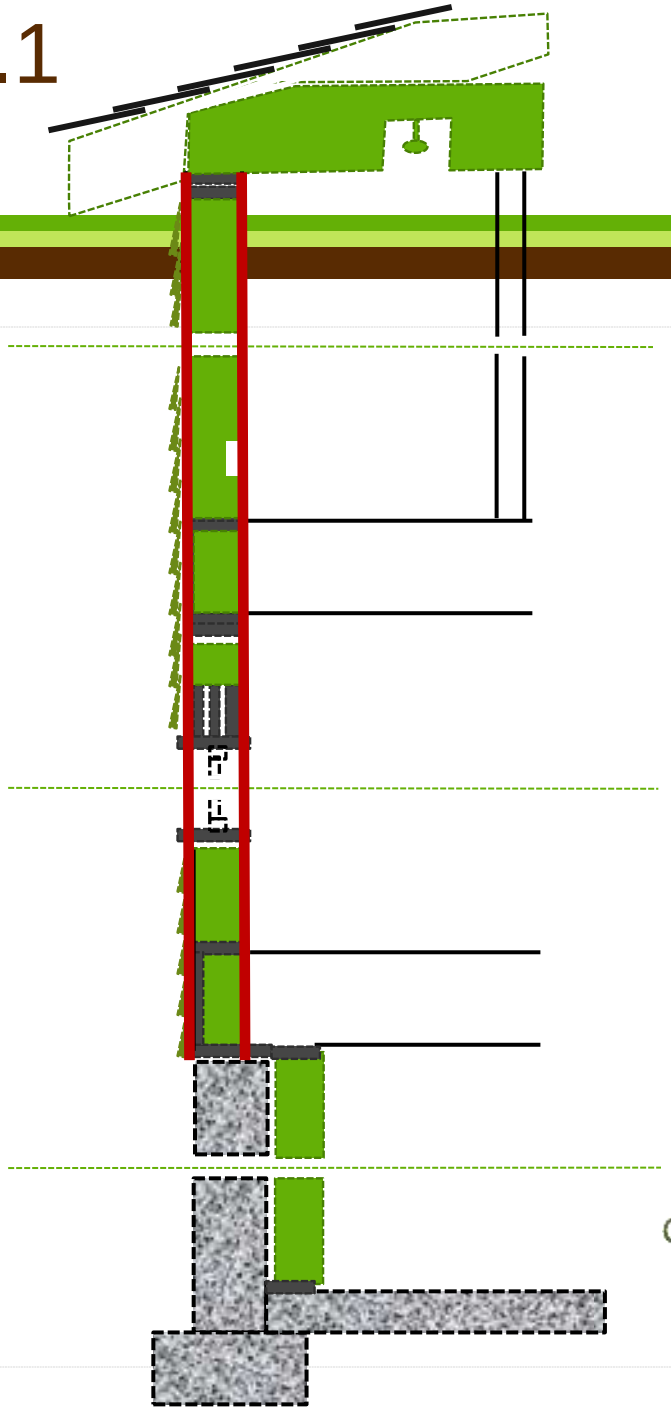

Unconditioned Space
Conditioned Space
Thermal Boundary
Air Barrier

Table R402.4.1.1 Air Barrier

- Define Exterior or Interior Air Barrier



Conservation Services Group

Table R402.4.1.1
Air & Thermal Barrier (Mandatory)

Continuous air barrier shall be installed in the building envelope.

Photo © Tremco Inc.

Photo © Conservation Services Group

CC

Table R402.4.1.1
Air Barrier (Mandatory)

Photo © Owens Corning

ECC

R402.4.1.1
Air and Thermal Barrier (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Air and Thermal Barrier (Mandatory)

Air permeable insulation shall not be used as a sealing material

Photo © Conservation Services Group

Table R402.4.1.1
Air and Thermal Barrier (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Air and Thermal Barrier (Mandatory)

Photo © Conservation Services Group

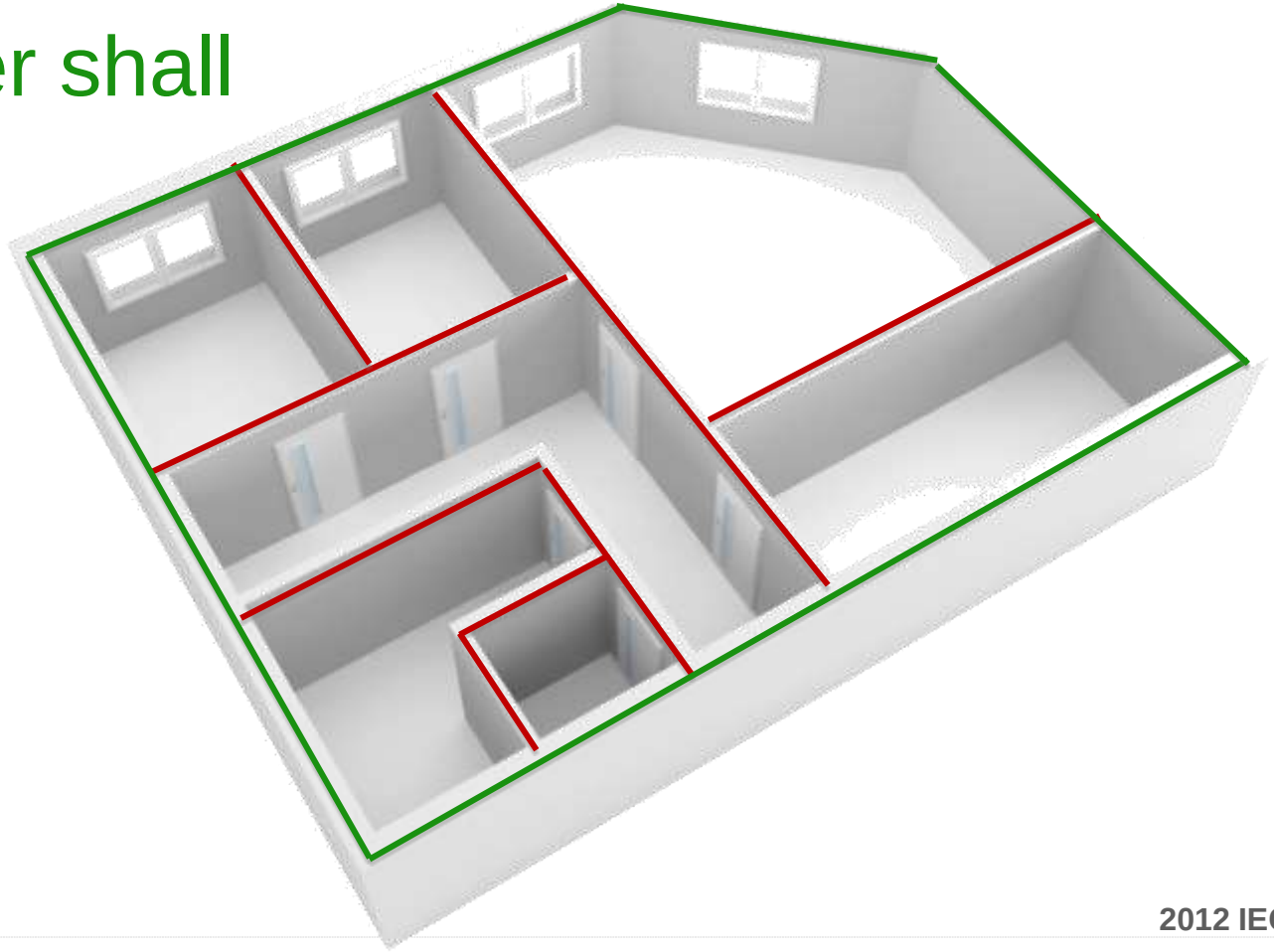
Table R402.4.1.1
Ceiling / Attic (Mandatory)

The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed

Photo © Conservation Services Group

Table R402.4.1.1
Ceiling / Attic (Mandatory)

Breaks or joints in the air barrier shall be sealed



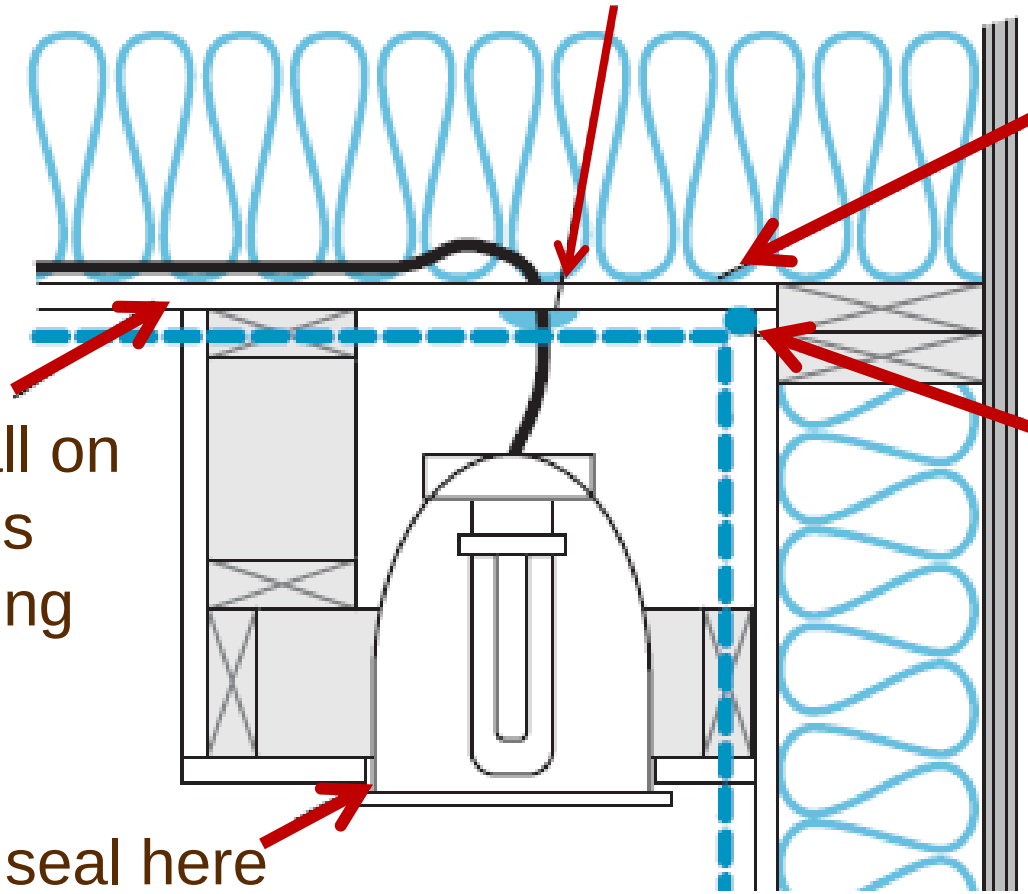
2012 IECC

Table R402.4.1.1
Ceiling / Attic (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Dropped Ceiling / Attic (Mandatory)

Seal all penetrations through air barrier



Air barrier follows insulation not soffit

Hang drywall on walls/ceilings before framing soffits and chases

Seal air barrier joints

No need to seal here

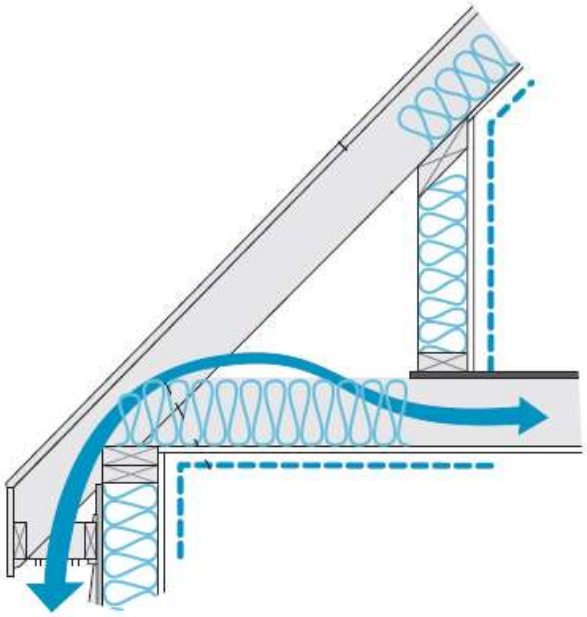
2012 IECC

R402.4.1.1
Ceiling / Attic (Mandatory)

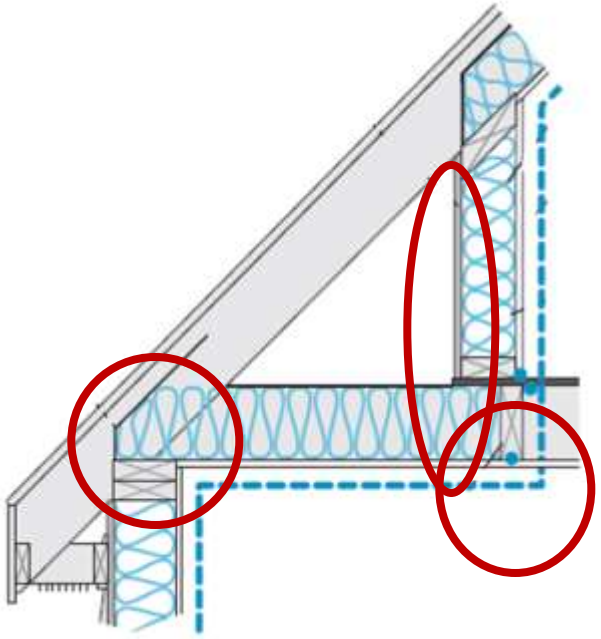
Sealed Access Opening

Photo © Conservation Services Group

2012 IECC



Knee walls shall be sealed

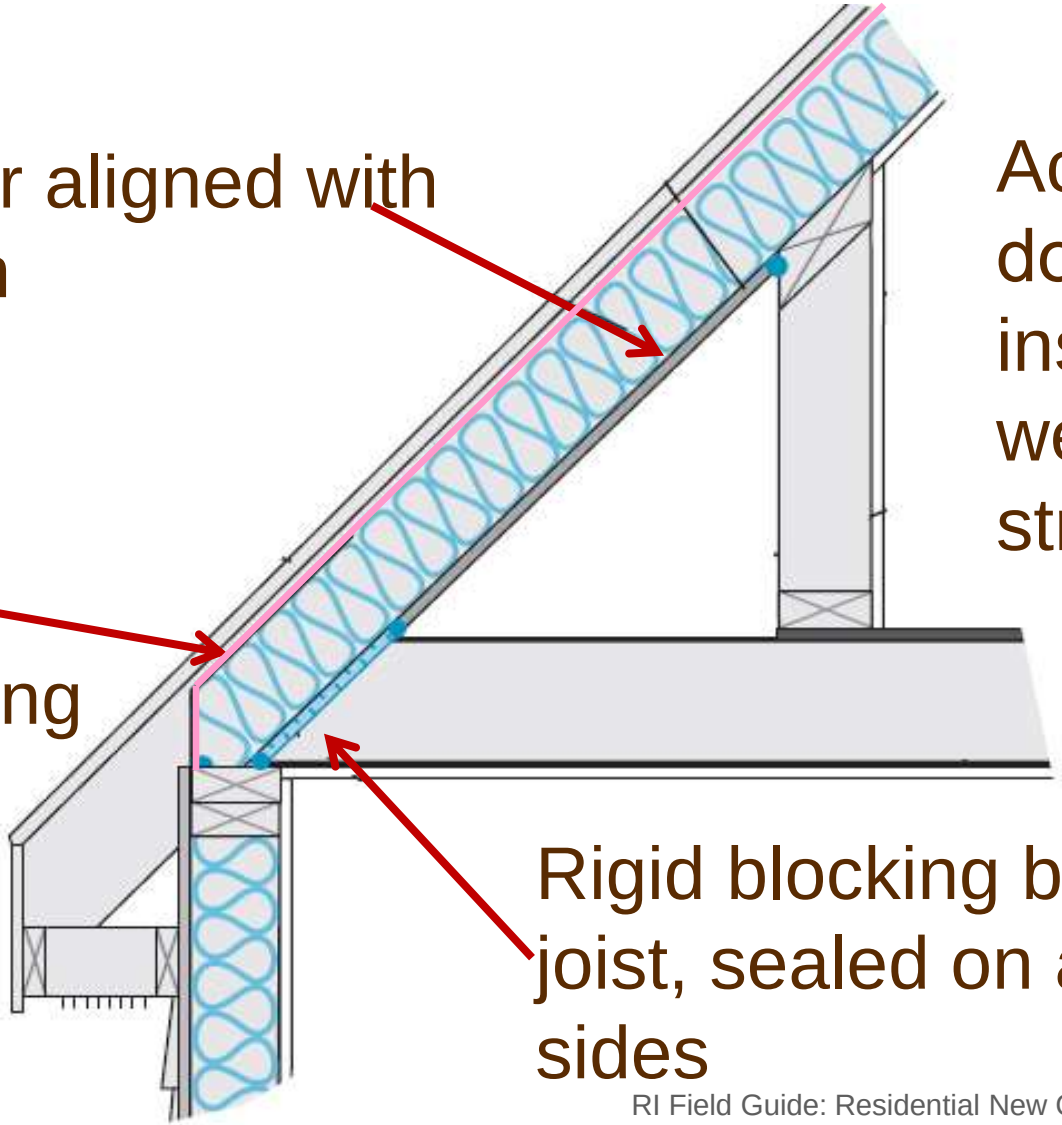


MA Field Guide

Photo © Conservation Services Group

Photo © Conservation Services Group

Table R402.4.1.1
Ceiling / Attic (Mandatory)



Air barrier aligned with insulation

Access doors don't need insulation or weather stripping

Baffle prevents windwashing

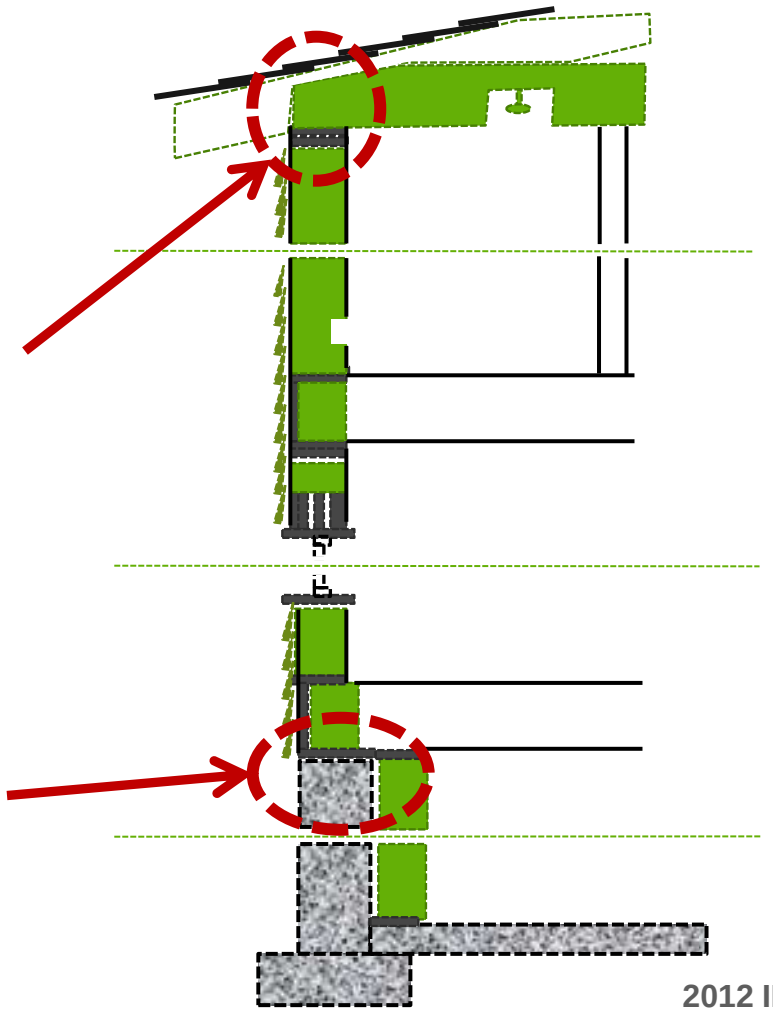
Rigid blocking between joist, sealed on all four sides

2012 IECC

R402.4.1.1
Walls (Mandatory)

The junction of the top plate and top of exterior walls shall be sealed

Junction of foundation and sill plate is sealed



2012 IECC

Table R402.4.1.1
Walls (Mandatory)

Photo © Conservation Services Group

Photo © Conservation Services Group

2012 IECC

R402.4.1.1
Walls (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1 Windows, Skylights & Doors (Mandatory)

Photo © Conservation Services Group

Photo © Conservation Services Group

Table R402.4.1.1
Rim Joists (Mandatory)

Rim joists shall be insulated and include air barrier

Photo © Conservation Services Group

Photo © Conservation Services Group

2012 IECC

Table R402.4.1.1
Floors (Mandatory)

Photo © Conservation Services Group

Photo © Conservation Services Group

2012 IECC

Table R402.4.1.1 Crawl Space Walls (Mandatory)

Photo © Conservation Services Group

2012 IECC

R402.4.1.1
Crawlspace Walls (Mandatory)

Exposed earth in unvented crawl space

- Class 1 vapor retarder **overlapped and sealed by 6”*

2012 IECC

Table R402.4.1.1
Duct Shafts (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Duct Shafts (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Utility Penetrations (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Flue Shafts (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Narrow Cavities (Mandatory)

Photo © Conservation Services Group

Photo © Conservation Services Group

Table R402.4.1.1
Garage Separation (Mandatory)

Air sealing shall be provided *between the garage and conditioned spaces.*

Table R402.4.1.1
Recessed Lighting (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Wiring (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Plumbing (Mandatory)

Photo © Conservation Services Group

Photo © Conservation Services Group

Table R402.4.1.1
Shower/Tubs (Mandatory)

Photo © Conservation Services Group

2012 IECC

Table R402.4.1.1
Electrical/Phone Boxes (Mandatory)

Daylight!

Photo © Conservation Services Group

Photo © Conservation Services Group

Table R402.4.1.1
HVAC Register Boots (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Fireplaces (Mandatory)

Photo © Conservation Services Group

Table R402.4.1.1
Fireplaces (Mandatory)

Photo © Conservation Services Group

R402.4
Air Leakage (Mandatory)

2009 IECC	2012 IECC
Air Barrier & Insulation Installation Table	**Air Barrier & Insulation Installation Table**
OR	***AND***
Blower Door Test 7 ACH50	**Blower Door Test 3 ACH50**

R404.1
Lighting Equipment (Mandatory)

Minimum *75%* high-efficacy lamps in permanent fixtures

Photo © Conservation Services Group

Photo © Conservation Services Group

2012 IECC

R404.1
Lighting Equipment (Mandatory)

2012 IECC

MA Amendments

Testing and verification shall be done by a HERS Rater, HERS Rating Field Inspector, an applicable BPI Certified professional, or a BBRS approved third party.

- Air Tightness (R402.4)
- Ductwork (R403.2)
- Ventilation Testing (R403.5)

BBRS “Approved Third Party”

“An *individual who, in a notarized letter of verification, swears in writing under the penalties of perjury that he/she has demonstrated competence and at least two (2) years of experience in the field of blower door, and/or duct blasting and/or, mechanical ventilation testing*" and that the building official shall accept said letter as part of the permit application, and that this policy shall expire on the date that the 9th edition of 780 CMR is in effect.

MA RNC Tiers & Incentives -2014

2014 Incentives			
Tier	Savings over Baseline*	Single Family Unit	Multifamily Unit
Tier I	15-29.9%	$750	$650
Tier II	30-44.9%	$1,250	$1,150
Tier III	45+%	$7,000	$4,000

*New Construction baseline = % savings over Massachusetts specific baseline

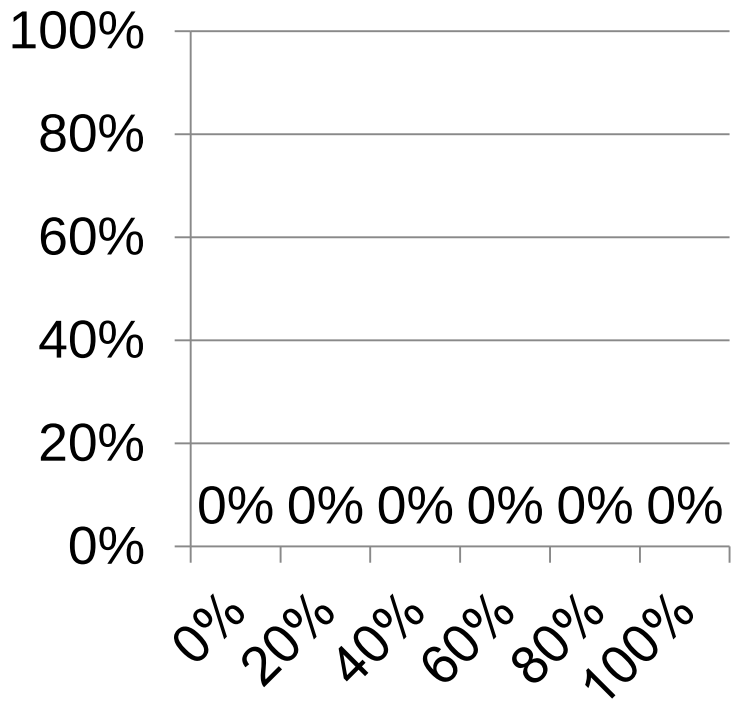
Additional Training Opportunities

- Residential
  - HVAC and Indoor Air Quality
  - The Changing Residential Energy Code - Moving from 2009 IECC to 2012 IECC
- Commercial
  - MA Commercial Energy Code: Envelope and Building Science
  - MA Commercial Energy Code: Lighting, Lighting Control and Other Electrical Provisions
  - MA Commercial Energy Code: Mechanical Provisions

Program Baseline Question

Approximately what percentage of all permits (new homes/buildings and retrofits to existing structures) in your jurisdiction are for retrofits?

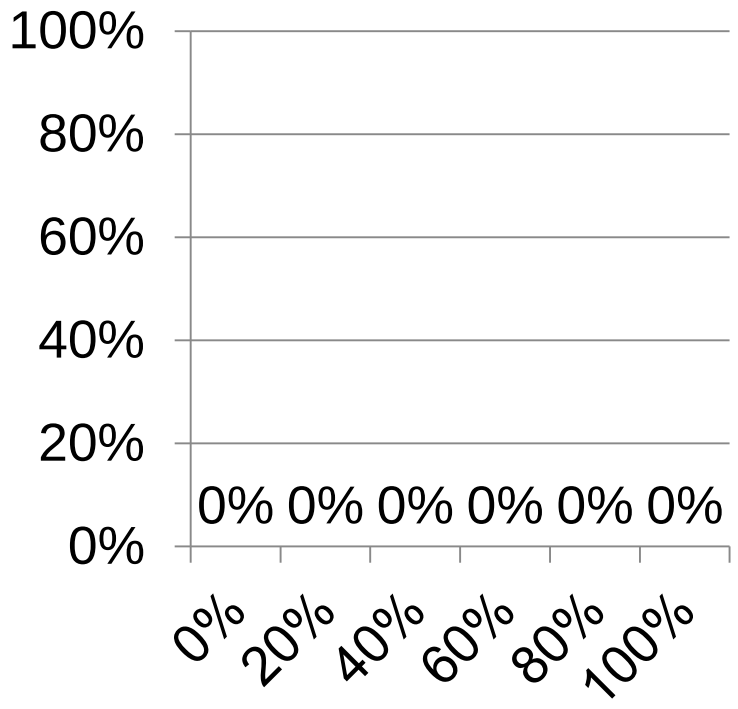
1. **0%**
2. **20%**
3. **40%**
4. **60%**
5. **80%**
6. **100%**



Program Baseline Question

- Out of the permits that are for retrofits to existing structures, approximately what percentage are energy related (for example, involve an addition to a structure which will affect energy consumption)?

1. **0%**
2. **20%**
3. **40%**
4. **60%**
5. **80%**
6. **100%**



Rate the Trainer

Trainer was organized and prepared

Strongly Agree — **Strongly Disagree**

1 2 3 4 5 6

Rate the Trainer

Trainer was knowledgeable and informative

Strongly Agree — **Strongly Disagree**

1 2 3 4 5 6

Rate the Training

I would recommend this training

Strongly Agree — **Strongly Disagree**

1 2 3 4 5 6

Mass Save® Energy Code Technical Support

Project Specific Code Assistance

- MA code officials
- Design professionals
- Contractors
- Material suppliers
- Other

Toll-free energy code support

855-757-9717

Phone assistance

Office visits

Project site visits

SAVE THE DATE

MARCH 3–5, 2015

SEAPORT WORLD TRADE CENTER BOSTON, MA

BUILDINGENERGY 15

CONFERENCE + TRADE SHOW FOR RENEWABLE ENERGY AND GREEN BUILDING PROFESSIONALS

Thank you

Massachusetts Code Compliance Support Initiative

Conservation Services Group

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Savings through energy efficiency